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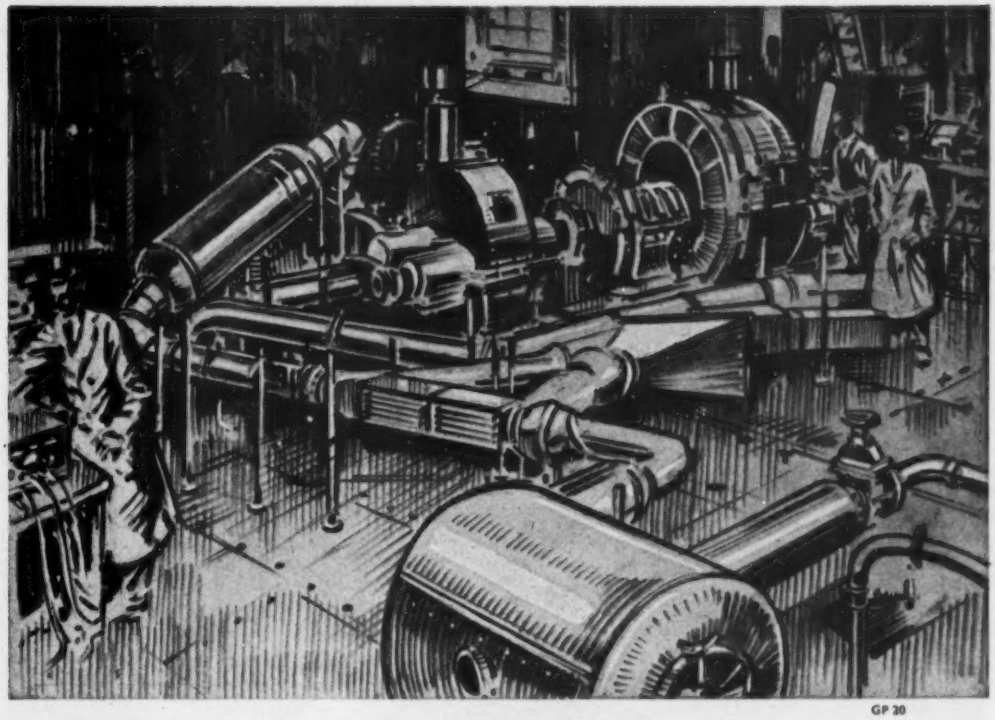

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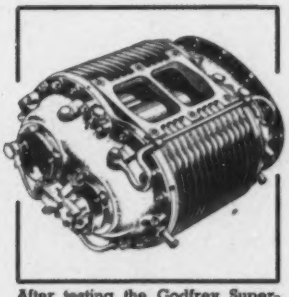

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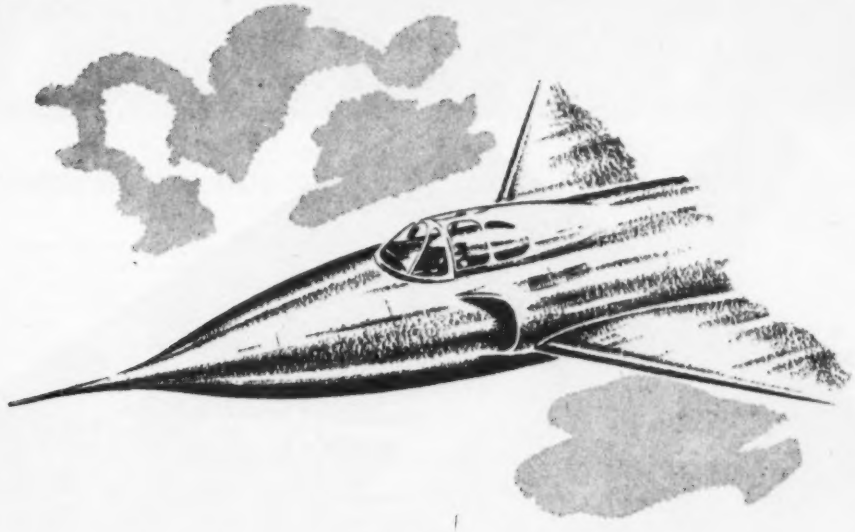

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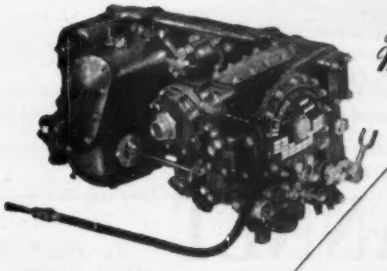

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Positions—Fixed and Fluid

WE recall having seen, somewhere or other, a drawing of a caveman and his mate; it was captioned: "Now we have learned to communicate, shut up!" To take the cynical view, these are words that might also be used of current international political discussions; and, paraphrased to read, "Not until we have learned to shut up shall we get some standard communications and aids," they could be applied with equal force to certain of the international civil aviation deliberations. Increasingly critical views are being expressed about those who have been talking navigational aids for at least five years and have so far failed to agree upon any one of them.

It is, of course, primarily a political matter, with America lined up against Europe, and particularly Britain. Meanwhile, because such aids (with the prospect of substitute or additional equipment being needed later on) are altogether too expensive to permit any one operator to make an independent choice, passengers are being flown in aircraft which have no precise means of position-fixing. This implies a lower standard of safety than could be attained with the aid of modern equipment, and as the traffic pattern becomes more complex the position is increasingly aggravated.

Very few passengers know anything about such matters, but it is undoubtedly the duty of all responsible operators to see that a halt is called to years of chatter and to make sure that a decision is reached *and* implemented.

On several occasions we have discussed in our columns the claims made for the two principal rivals among navigational aids, namely, the British Decca system with Flight Log and, now, I.T.R. (Integrated Track Range) on the one hand and the American V.O.R. with D.M.E. (Omni-Range, with Distance-Measuring Equipment) on the other. This country and its supporters feel that Decca is the best aid, especially for Europe. It is available immediately; in fact, the chains have been in operation in this country and Denmark for some years and, as reported on page 109, the new chain in Germany is now operating. France at present is installing Decca, and certain South American countries are actively considering whether they, also, should adopt it.

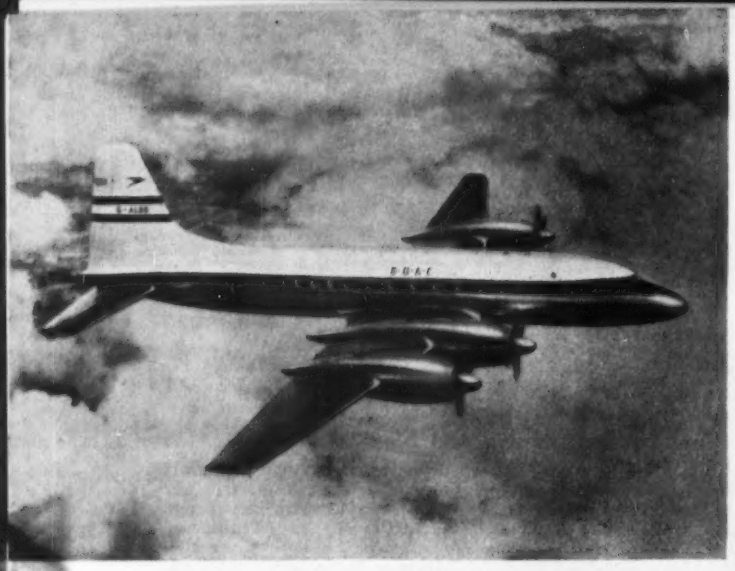
Chief Executive's Appraisal

We may quote here Mr. Peter Masefield's answers to questions regarding B.E.A.'s opinion of Decca: "We are in favour of Decca because we think it is cheaper and lighter, no less accurate and convenient and it is certainly more satisfactory for the helicopter. . . . On the other hand, we would not wish to be the only airline using Decca, because of the limited amount of aviation equipment which would then be available. So far as we can see, as an aid in the air, there is nothing to choose between Decca and V.O.R.-plus-D.M.E. provided the V.O.R.-D.M.E. has adequate pictorial presentation, as in the Decca Flight Log. . . . the Decca system is right for the helicopter because it is accurate right down to ground level. . . ."

Without D.M.E., V.O.R. is operative in various parts of America, but we have not heard of any airline dependent upon it. D.M.E., however, is not yet available: in fact, there seem to have been some second thoughts about it. V.O.R. without D.M.E. would be inadequate as an international standard.

In deciding what aids should be adopted, airlines would be wise to consider *all* costs, because it would be wishful thinking to suppose that they will not ultimately have to pay. Cost is, of course, a main talking-point in favour of Decca. The problem of the operator who would prefer Decca for Europe but will not commit himself because he might also have to fit V.O.R. for New York is, of course, appreciated; it is, in fact, the crux of the whole matter so far as Eurpoean aids are concerned.

It is to be hoped that when the representatives of the various countries gather again at the regional I.C.A.O. air navigation meeting in Paris on February 26th they will arrive with an appreciation of the urgency of the situation. It is also to be hoped that the cases will be more competently handled than at Montreal and the jury be better qualified to judge the technical rather than the political issues.



BRISTOL 175

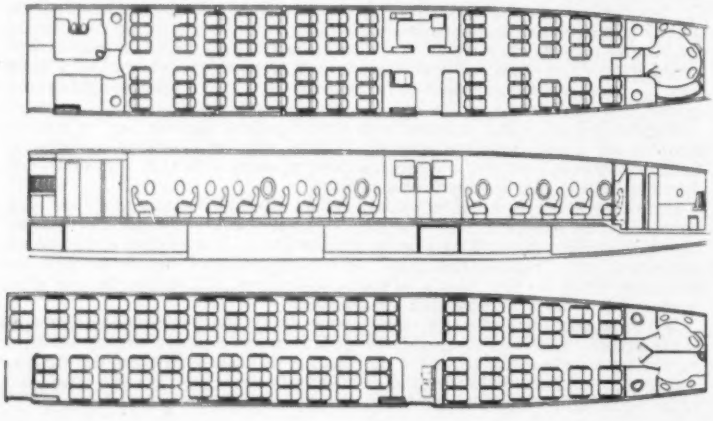
For B.O.A.C.'s New Fleet: Adaptability from Luxury Liner to Freighter: High Block Speed with Maximum Economy

SINCE the existence of the Bristol 175 project first became generally known in 1949, occasional brief statements have been made regarding the intended size and performance of the aircraft, and each has given a different impression. Thus it is not surprising that even today, when the first prototypes are well advanced in construction, some doubts still remain about principal dimensions and precise capabilities. Now that further changes are unlikely, other than those of the kind normally associated with the development of a commercial aircraft, it is clearly desirable that the importance and outstanding qualities of this promising new aircraft should be generally recognized. Because both the manufacturers and B.O.A.C.—the first customers—are aware of this fact, more detailed information has been made available for the first time.

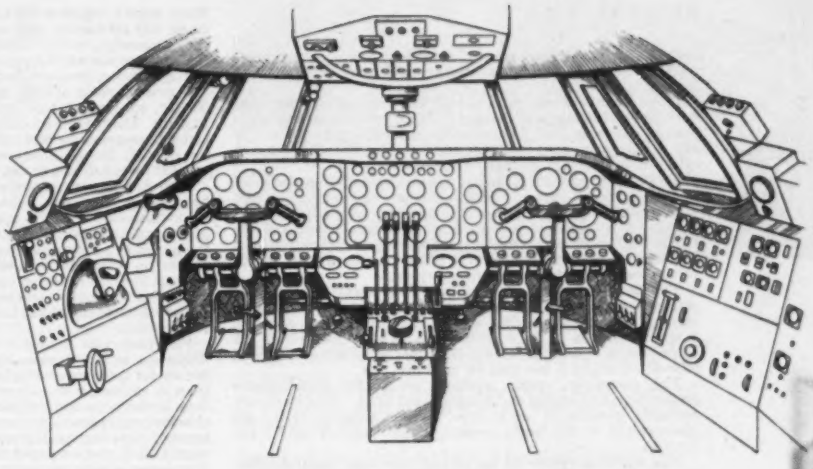
The remarkable swing-over in thought during the last few years, from the view that air travel is primarily a luxury for the few to the belief that air coaches for the million should be the principal aim (with *de luxe* services of the B.O.A.C. "Monarch" type as the exception) becomes more apparent each day. In the light of this tendency towards high-density travel, B.O.A.C. are specifying alterations to the interior layout originally visualized for the Bristol 175. (Remembering, perhaps, B.E.A.'s difficulty in persuading people to call an Ambassador an Elizabethan, B.O.A.C. prefer at present to employ this non-commital type-number; the makers, on the other hand, use the name Britannia.) The order for 25 machines (or, including the prototype, 26) at a cost of about £550,000 each, is probably the largest single contract ever placed with the British industry for a commercial type.

Not only is the 175 going to be particularly pleasing in appearance; it is already apparent that the finish will be of unusually high quality. Power will be given by four Bristol Proteus 3 turboprops—lighter and more powerful versions of the earlier Proteus described in detail, with sectioned drawing, in *Flight* of August 18th, 1949. The outstanding feature of the design, and one making for flexibility of operation and ease of control and starting, is the free-turbine layout, in which the compressor-driving turbine and the airscrew-driving second-stage turbine have no mechanical connection. The Proteus, it will be remembered, has its air intake at the rear of the axial compressor; the air, after passing forward, moves radially outward through a centrifugal compressor, then doubles back to the turbines through the combustion chambers positioned around the axial stator casing. This airflow pattern is not, perhaps, to be considered ideal today, when the direct front intake is usually preferred; but, on the positive side, and apart from its compactness, such a layout does happen to have the advantage of providing a simple solution to the intake icing problem.

Dimensions and other data for the 175 are tabulated later, but here we may confirm that the span is 140ft, while the all-up weight will be 130,000 lb for a start and will be increased after development to 140,000 lb. According to the number of seats placed on each side of the aisle and the arrangement and elaboration of the galley and toilet compartment, a maximum of 107 passengers may be provided for. The special method of seat attachment permits this flexibility of accommodation. Over the whole length of the cabin run mounting rails drilled at centres of one-inch pitch to take quick-release anchorage fittings. The legs of the multiple seats are also adjustable sideways in increments of half-an-inch. Thus the flexibility is achieved without the use of special or handed seat units. The fittings are stressed for accelerations of 9g. Mixed-traffic and all-cargo interior arrangements have also been planned.



Two typical interior layouts suggested for the 175 by the Bristol company accommodate, respectively, 74 passengers (two upper views) and 104 passengers (below). Neither of these conforms exactly with B.O.A.C.'s latest specification, although the high-density version shown here has both toilet compartments at the rear end. The proposed 78-place version has only five seats abreast and the additional space is found amidships in place of the galley, steward's station and coat locker depicted in the upper drawing.



The cockpit gives every appearance of comfort and efficient arrangement. The prominent controls on the port side-panel in this sketch are for nosewheel steering and cabin-pressure relief. On the pilot's left can also be seen the cloud-collision viewer. On the second pilot's starboard side are panels for fuel, air-conditioning and electrical systems. The radio controls are in the roof. Bristols point out that all flight and engineering controls are grouped so that on suitable routes it would be possible to operate with a crew of two. The normal five-crew layout is illustrated below.

B.O.A.C. are currently considering three layouts to suit the two contrasting requirements of first-class and high-density travel. What may be termed the fixtures would be very similar in each case, and the total number of passengers carried would depend upon the number of seats placed abreast. One layout would be for 63 persons in four seats abreast ; a second with 78, five abreast; and the third with 90 or over with six abreast. All seats would be at a pitch of 40 to 41in.

It seems likely that both toilet compartments will be at the rear end of the aircraft, and the galley transversely at the front. There is room for a third toilet compartment between the other two, and with the aid of double doors it could be made to communicate with either the port or the starboard compartments at the discretion of the steward.

For high-density travel the galley would be more of a buffet, and the fitments on the port side of the fuselage would be replaced by additional luggage space. An additional toilet and coat locker could also be placed forward, and these compartments would take up all or part of the space which might otherwise be a main-deck freight-hold. Mock-ups are now being examined at Bristol.

At a much later stage a longer-fuselage version of the aircraft may be produced; an addition of some 10ft is in mind, evenly distributed fore and aft of the wing. Such an extension is in part made possible by the very satisfactory weight figure achieved for the 175. In coming months, with the increasing use of plastics, glass and asbestos materials, and further substitution of Redux for rivets, an additional saving in structure-weight may be possible. The figure already achieved—23.5 per cent of gross weight—is believed to be the best to date for any aircraft in this class.

Of performance, it may be said that the 175 is expected to prove unsurpassed as a potential money-maker, its operating costs having the edge on every other type for which figures have been calculated. It is likely to be able to break even at under 50 per cent load-factor on several projected routes. It is also likely to prove the best answer to the "range with volumetric" requirements of Commonwealth operators. In fact (and this is not sales talk), the still-air range with maximum payload will be 4,000 statute miles and what is termed the volumetric payload, will amount to 25,000 lb. The 175's competitors are also likely to be shown a clean pair of heels at 370 m.p.h. at 35,000ft. It scarcely needs to be added that B.O.A.C. are not the only operators likely to appreciate these qualities; but until the prototype flies this summer—two may be airborne by Farnborough-time in September—no other orders are likely to be announced.

B.O.A.C.'s first aircraft is due for delivery with Proteus 3 turboprops early in 1954 and the rest of the order is expected to follow at the rate of approximately one a month. The prototypes will do their development flying with an earlier mark of Proteus installed—as, incidentally, will the Princess flying-boat.

A general introductory description of the 175 and its equipment follows.

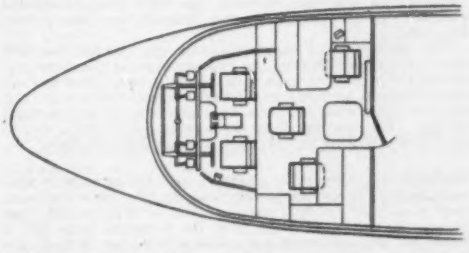
It is in no way derogatory to the 175 to remark that it is a wholly conventional low-wing monoplane with nosewheel landing-gear and single fin. Its cabins are fully air-conditioned, and reference has already been made to the flexibility of passenger layout. The primary structural material is aluminium alloy, in sheet, strip, tube, extruded and forged forms. Liberal use is made of the Redux process, and all external surfaces are flush-riveted. The wing is slightly swept back and has uniform taper from centre-line to tips. Spanwise extruded stringers, close pitched and of Z-section, are used to stiffen the upper and lower skins. These are attached to vertical shear-webs to form a spar box with as few ribs as possible. The normal fuel load of 5,790 gallons is carried in flexible-bag tanks in the box spar. Maximum tankage is for 7,000 gallons. The engine nacelles are an integral part of the wing structure.

The wing leading edges have inner skins with chord-wise corrugations forming ducts for hot air (this de-icing system will be referred to later), and they are detachable in sections.

The whole of the fuselage, which is of circular cross-section, is pressurized except for the small nose- and tail-sections, and the cut-out which accommodates the wing spar. For some 40ft of its length before tapering fore and aft the diameter is approximately 12ft. The windscreen is an integral part of the forward bulkhead structure. There are two passenger doors on the port side of the fuselage and two freight hatches underneath and to starboard. All these, and the emergency exits, open inwards.

A somewhat unusual feature is the construction of the removable floor-panels between the eight longitudinal members which form the seat-attachment rails. These panels are of sandwich construction, in which high-tensile Durestos plastic outer laminations have an end-grain-balsa core. The Bristol Aeroplane Company state that this method of construction gives the best available combination of heat-insulation and resistance to fire, abrasion and indentation, while keeping the weight low, and that it is superior in these respects to metal floor-panels.

The main flying controls are connected to full-span servo tabs which operate the surfaces aerodynamically. The surfaces themselves are aerodynamically balanced. It is necessary to provide artificial "feel" for the pilot, affording positive self-centering and an increase in control-load with displacement and aircraft speed. The device used centres about a torsion spring anchored to the



Provision will normally be made for five crew stations: captain, first officer, radio officer (behind captain), navigator (starboard rear seat), and supernumerary. This fifth seat rotates and is quickly removable. Behind it is seen the sextant platform.

BRISTOL 175 . . .

airframe structure at one end and fitted with a lever at the other; variation of the length of the lever provides variation of control-load.

Large double-slotted flaps occupy the full trailing-edge span between the fuselage and ailerons. There are an inner and outer pair on each side, and the maximum deflection is 45 deg. The slat is fixed relative to the flap, and does not become operative until the flap exceeds an angle of 20 deg.

Under-wing pressure refuelling is provided for, with one point in each outboard nacelle. The maximum rate is 150 gal/min, with a bowser pressure of 25 lb/sq in—half the pressure which the system is capable of withstanding. Emergency gravity-filling points are located beside the shut-off valves and fuel may also be off-loaded through the under-wing points by selecting the appropriate position on the manual four-way cock.

The landing-gear consists of two four-wheel bogie undercarriages, with hydraulic brakes on all wheels, and a nose undercarriage with twin steerable wheels, the steering and castering range of which is 50 deg on either side. The nosewheels do not carry brakes. The track of each front pair of wheels on the main four-wheel bogies is less than for each rear pair.

The hydraulic system provides power for undercarriage retraction, wheel-brakes and flying-control locks. The maximum operating pressure is 4,000 lb/sq in, but reducing valves are incorporated in the brake system, which requires only 1,500 lb/sq in.

The electrical system of the aircraft has three main supplies: 200v A.C., 112v D.C. and 28v D.C. The A.C. supply is used for the electro-thermal heating of aircrews, for windscreen de-icing and for the air-conditioning and refrigeration-fan motors. The 112v D.C. is required for the starter motors, flap motors, and for the pantry, toilet, air-conditioning and lighting. Secondary supplies from the 112v system, obtained *via* four inverters, are utilized as follows: No. 1: gyro compass, Zero Reader, inner-engine instruments and controls, and stand-by for No. 2; No. 2: co-pilot's instruments, autopilot, outer-engine instruments and controls, and stand-by for No. 1; No. 3: cloud collision-warning radar; No. 4: similar in type to No. 3, and used for the D.M.E. Supplies Nos. 3 and 4 act as stand-bys for each other.

Most of the air-conditioning equipment is housed in the engine nacelles. The components are mounted individually and are readily accessible for maintaince. Two entirely separate and independent systems are provided, one in each wing, and they feed into the body independently through non-return valves. The outboard nacelle contains the engine-driven blower, silencer, after-cooler and off-loading spill valves. The inboard nacelle contains the refrigerator, with its cooler and ground-running fan, while in the body are the water-separators, re-circulating fans, smoke filter and deodorizer, pressure-control valves and distribution system.

Maximum cabin-altitude is 6,000ft up to 35,000ft, and, if it is desired, sea-level altitude can be maintained in the cabin up to 21,000ft. The maximum differential pressure is 8.3 lb/sq in. For ambient temperatures between −70 deg C (−94 deg F) and 27 deg C (80 deg F) the cabin can be maintained automatically at any selected value between 17 deg C (63 deg F) and 24 deg C (75 deg F).

Two free-running refrigerators are provided to deal with very hot, humid conditions. The refrigerators, together with water separators, can keep the relative humidity in the cabins below 70 per cent for all possible hot and humid ambient conditions, while the humidity can be raised to 30 per cent by injecting steam from an electric boiler into the ventilating air. Some 25 lb/min of fresh unhumidified air is passed up wall ducts, while 7 lb/min of fresh air, cooled below cabin temperature, is available for the use of passengers through individual louvres. The freight holds are also air-conditioned.

Full protection against severe continuous icing is provided. There are several systems, the principal one of which provides hot air for the wing leading-edge. Heat for this purpose is taken from an exchanger in each power plant, fed by hot gas tapped from between the two turbine stages. The tail unit, including the elevator horn balances, is de-iced electrically with the aid of heated external mats on the leading edges. This is a cyclic electrical system, as is that employed for the airscrew blades and spinners. The power plants themselves, and their air intakes, are de-iced with the aid of gases tapped from between the turbines, and the six forward windscreen panels are electrically heated for anti-icing and de-misting.

PRINCIPAL DATA: BRISTOL 175 BRITANNIA
(Four Bristol Proteus Turboprops)

Span	140ft
Length	114ft
Height	36ft 8in
Track	31ft
Wing area	2,055 sq ft
All-up weight	140,000 lb
Volumetric payload	25,000 lb
Still-air range with max payload	4,000 st. miles
Max. still-air range	5,600 st. miles
Landing weight	110,000 lb
Take-off distance (at 140,000 lb in 5 m.p.h. wind)	3,700ft
Landing distance (at 140,000 lb in 5 m.p.h. wind)	2,800ft
Cruising speed at 35,000ft	367 m.p.h.

U.S. Production to be Trebled

FOR the first time since the Korean war began (writes a Washington correspondent) the U.S. aircraft industry can see plain sailing ahead for their military aircraft production programme. They expect, if all goes well, a trebled output—18,000 machines a year—by next December.

But this long-delayed rise in production will not solve all the problems; there still are two main worries. The first is that when the industry gets its output up to 1,500 a month, by the end of this year, it will only be able to continue for a year or two at this rate, while the U.S. Air Force is being built up to a strength of 140 aircraft per group. After 1953 the problem will be to taper-off production to between 7,000 and 10,000 aircraft a year.

Secondly, increasingly apparent progress by Russian designers has led their American opposite numbers to urge that broader specifications be offered, so that they can use their imaginations to meet Air Force needs. They point out that Britain, though hampered by controlled economy, has made some remarkable technical advances because her best designers have been given a free hand.

The production of commercial and light aircraft has now been seriously affected by the shortage of material and the pre-occupation of manufacturers with military orders. Only 65 commercial aircraft were delivered in 1951, compared with 91 in 1950, and only 2,300 small machines were produced, as against 3,400 in 1950. The most significant development, incidentally, was the growth of helicopter activity, both in design and production.

British Aircraft to Scale

SINCE we published, in our S.B.A.C. Show Number last September, several pages of plan-view drawings of "British Aircraft to Scale," there has been a demand for their reprinting in booklet form.

Such a booklet has now been prepared. Several new types have been added that have appeared since the original publication, and there are now drawings of 85 different civil, Service and research aircraft. Apart from the interest provided by the scale contrasts—for example, the Dart Kitten (31ft 9in. span) is shown alongside the Brabazon (230ft)—*British Aircraft to Scale* forms a useful work of reference, for in addition to the illustrations there are detailed data tables on all current civil and military types. The drawings are by Barry Jones.

The booklet is obtainable from newsagents at 1s 6d or by post (2d extra) from Iliffe and Sons, Ltd., Dorset House, Stamford Street, London S.E.1.

PERSONAL JET: Considerably modified since it first appeared, in semi-mock-up form, at last year's Paris Show, the SIPA 200 tourer-trainer made a successful first flight on January 12th in the hands of M. Roger Lounay, the makers' chief test pilot. The Turboméca Palas (330 lb thrust) has wing-root intakes and a tail-pipe at the rear of the nacelle. Carrying two, side by side, the little machine has a gross weight of 1,609 lb; its span is 23ft 5in; and it is credited with a maximum cruising speed of 236 m.p.h. Range at reduced speed and optimum altitude is said to be 435 miles.

FROM ALL QUARTERS

FRANCASTER: As reported on page 90, the French Naval Air Arm is acquiring 54 Avro Lancasters for anti-submarine duties. Seen in the cockpit of one of them, at Woodford, is Capitaine de Corvette Henri Aragnol, senior pilot responsible for acceptance and ferrying of the aircraft, delivery of which has begun.

I.Ae.S. Annual Meeting

THE twentieth Annual Meeting of the Institute of the Aeronautical Sciences is to be held at the Hotel Astor, New York City, from January 28th until February 1st. At the Honours Night Dinner, on January 28th, two Honorary Fellowships will be presented, the American Hon. Fellow for 1952 being Mr. Leroy R. Grumman, chairman of Grumman Aircraft, and the Foreign Hon. Fellow Mr. John Hamilton Parkin, Director of Canada's National Aeronautical Establishment. Ten Americans will also receive I.Ae.S. Fellowships and the Losey, Jeffries, Reed and Sperry awards will be presented. Mr. Peter G. Masefield, incidentally, is named as principal luncheon speaker for one of the sessions.

Ashton for Decca Route Trials

AS a result of several unforseen circumstances, it will not be possible to equip the Comet for Decca Integrated Track Range experiments during the next week or two as had been intended. The trials with this aircraft will not now be made before March. In order, however, that tests may be made in time for the I.C.A.O. European Mediterranean Regional meeting on navigation aids, to be held in Paris on February 26th, an Avro Ashton is to make the first high-altitude trials. The equipment was being installed this week and the flights are to begin as soon as possible.

English Electric Directorship

AS briefly announced on page 91, Sir John Woods, G.C.B., M.V.O., has been appointed to the boards of both the English Electric Co., Ltd., and Marconi's Wireless Telegraph Co., Ltd.

Sir John joined the English Electric group of companies in 1951. Before that, from 1945, he had been Permanent Secretary of the Board of Trade.

His Civil Service career started thirty years ago as an assistant principal in the Treasury, and he was later secretary to the Trade Facilities Act Advisory Committee, principal private secretary to the Chancellor of the Exchequer, and a principal assistant secretary in the Treasury from 1940 to 1943. From 1943 to 1945 he was Permanent Secretary of the Ministry of Production.

SUPER TROOPER: Illustrated is a transport variant of the Russian-built copy of the Boeing B-29, seen at the annual flypast at Tushino last July. From the two hatches observed fore and aft 33 parachutists emerged, though there is no reason to suppose that this is a maximum load.

Full C. of A. for Comet

AS we close for press we learn that a notable event in British civil aviation occurred last Tuesday, January 22nd, when the Minister of Civil Aviation, Mr. J. S. Maclay, handed to the de Havilland Aircraft Co. Ltd. at Hatfield a full Certificate of Airworthiness for the Comet.

This signifies that the Comet, as a type, is now officially approved for commercial operation and so becomes the first turbojet civil airliner in the world.

Further Hunting Group Appointments

A FORTNIGHT ago we announced three new appointments within the Hunting Group, and now others are notified. Mr. Lindsay Clive Hunting, son of Mr. C. L. Hunting, (governing director of the Group) and nephew of the chairman, has been appointed to the Board of Hunting and Son, Ltd., the parent company.

Mr. Clive Hunting.

Mr. Clive Hunting, who was born in 1925, was educated at Loretto School and Trinity Hall, Cambridge, where he obtained an Honours Degree in history. He served in the R.N.V.R. from 1944 to 1947, mainly in H.M. destroyers *Obedient* and *Zest*. In the former, Mr. Hunting was on the Murmansk run, guarding the Arctic convoys.

On demobilization he spent a year travelling in South Africa and then returned to Cambridge to complete his studies before joining the Hunting Group in 1950. Since then he has done a tour of duty with all the United Kingdom companies and is now based at the Newcastle office.

Administrative changes made in the organization of Hunting Air Travel, Ltd., include the appointment of Mr. R. W. Wingrave as traffic manager and of Mr. F. H. Heneage-Finch (late of B.O.A.C.) to take over sales liaison and publicity duties on the managing director's staff. Percival Aircraft, Ltd., who are also a Hunting Group company, announce the appointment of Mr. K. Miller as general works manager.

Recognition Winners

THE Post 19/Y2 (Cheam) R.O.C. team were winners of the Aircraft Recognition Society's Hurricane Trophy Competition last Saturday. West London Aviation Club, last year's winners, were the runners-up, and No. 4F (Ilford) Sqn. won the Handley Page trophy for the best performance by A.T.C. cadets.

The winners accurately identified 30 out of 35 aircraft views, each projected on a screen for one second. There was a record entry of 51 teams.

Re-entering the Arena

ALL who remember the Gladiator—the single-seat, single-bay Gloster biplane with enclosed cockpit, single-strut cantilever undercarriage and four-machine-gun armament—will be interested to hear that two specimens have been purchased from Air Service Training, Ltd., by Flightways, charter operators at Eastleigh.

Flightways' chief, Mr. V. H. Bellamy—an old Fleet Air Arm Sea Gladiator pilot—hopes to "cannabilize" the pair and produce one airworthy machine in time for this year's R.Ae.S. Garden Party; he may also enter it for the King's Cup Race.

The two aircraft were originally given to A.S.T. by the Gloster Company for use in their engineering training school.

HERE AND THERE

Annual Carriers

IN a speech in Washington recently, Mr. Dan Kimball, Secretary of the U.S. Navy, said that it was planned to build a new aircraft carrier every year for the next ten years.

Australian Sailplane Record

THE Australian gliding distance record was broken on Christmas day by Keith Colver, who, after a tow to 1,500 ft by a Tiger Moth, flew 265 miles from Narromine to Jerilderie in eight hours.

Officially Discouraged

SENTENCES of 56 days' detention imposed on two officer cadets at R.A.F. station Feltwell, were confirmed last week. They had been found guilty of flying aircraft in a manner likely to damage them. Police alleged that the cadets flew between the roofs of houses.

The Racing Season

THE R.Ae.C. reminds pilots that the 1952 Register of Racing Numbers is now being compiled, and asks for details of aircraft whose owners wish them to be included. The Club also announces that this year's Daily Express Challenge Trophy Race will be flown on August 2nd, while the King's Cup Race will probably be held at the end of the season.

New Life for Lancs.

FIFTY-FOUR Lancasters are being supplied to the French Naval Air Arm, for anti-submarine operation from Western Union bases in North Africa. Of Mk 1 and 7 basic types, they are now being reconditioned and converted at A. V. Roe factories, and delivery has begun. The conversion of these bombers for naval reconnaissance involves the addition of much A.S.V. and other special equipment; long-range tanks are being fitted in the bomb-bays, and suspension is provided for air/sea rescue lifeboats. A photograph appears on p. 89.

SWEDISH PUNCH: On open-air show in Sweden, a Saab J-29 fighter (de Havilland Ghost) is seen to be double-banked with Bofors rocket projectiles. It may be remarked, incidentally, that the "U" painted on the vertical tail surfaces denotes "Utveckling" (development). More than 500 J-29s are under construction.

A.O.A. Meeting

THE annual general meeting of the Aerodrome Owners' Association is to be held at Londonderry House on February 21st, at 2.30 p.m.

Anti-Submarine Helicopters

SENSITIVE detection apparatus which can be lowered into the water while the helicopter carrying it hovers at about 50 ft over an area where a submarine is thought to be present is being tested as an anti-submarine weapon. In North Atlantic trials submarines have been detected at well below periscope depth, and it has been proved that three or four helicopters, working as a team over a wide area, can quickly pinpoint a submerged submarine. The apparatus is known to the U.S. Navy as the "sonar ear."

Charitable Chess

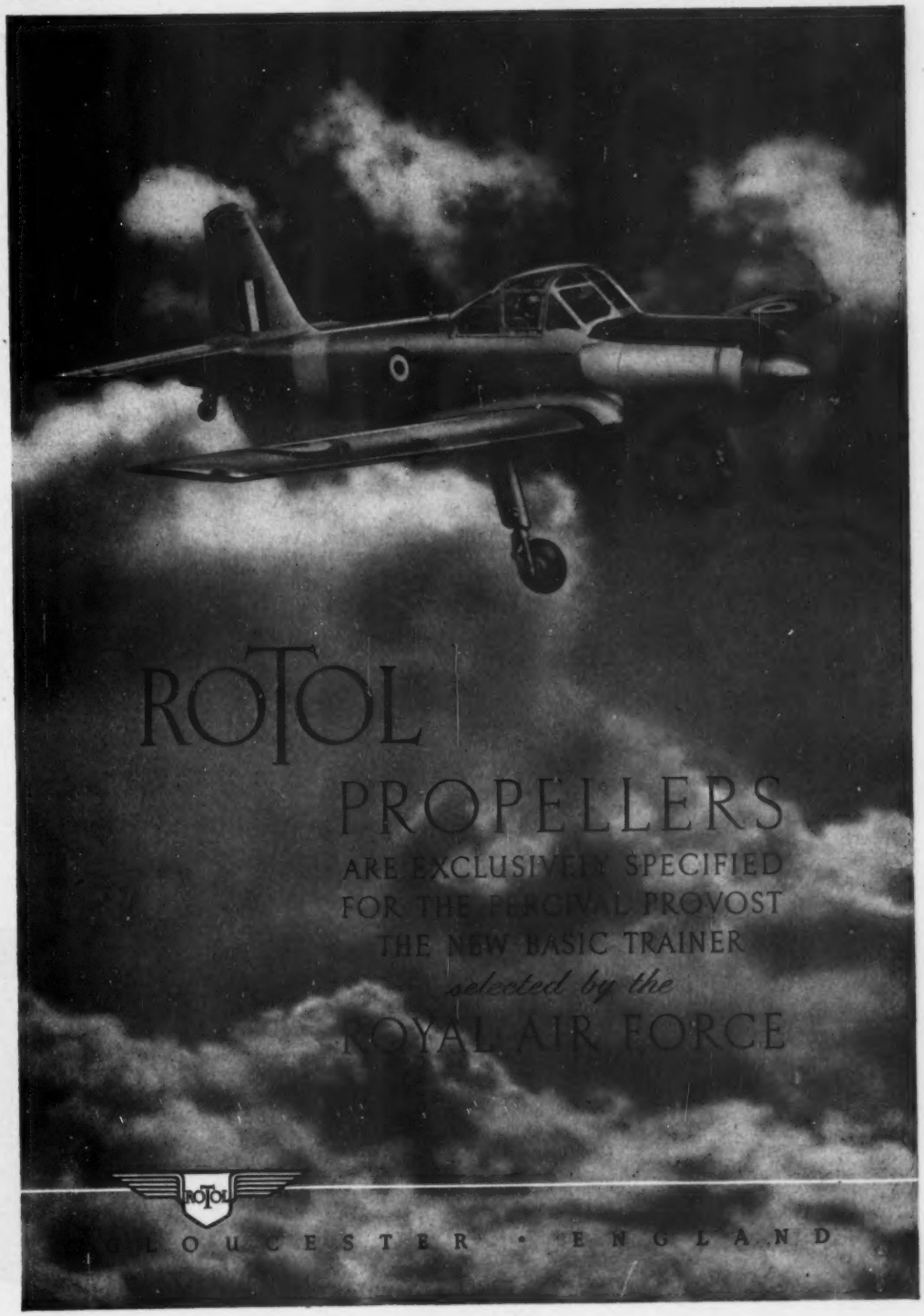
THE Battle of Britain Chess Tournament in aid of the R.A.F. Benevolent Fund will be revived this year in London and the Home Counties for the first time since 1948. Matches for a Trophy, and other prizes to the value of £20, will be played in the London area, finalists competing at the Air Ministry during Battle of Britain week. The tournament is sponsored by the Air Ministry Chess Club.

Mig's Objective

QUESTIONED recently as to the origin of the Mig-15, Gen. Vandenberg, U.S.A.F. Chief of Staff, said it was a short-range defensive interceptor possessing flight characteristics and armament which suggested it was designed primarily to combat high-altitude bombers. "In other words," he added, "the Russians' heavy investment in this plane demonstrated their awareness of the United States Strategic Air Command's powers."

THE AIR MARSHAL STEPS OUT: When Air Marshal A. C. Stevens, C.B., the A.O.C.-in-C. Coastal Command, paid a visit to the Bristol works recently in company with two of his staff officers, he was flown down from his Northwood headquarters to Filton in a Sycamore helicopter piloted by C. T. D. Hosegood. An increasing number of visits are being paid to factories by senior officers, to the benefit of both sides.

ANGLO-ITALIAN: On December 18th the first Macchi-built Vampire flew at Venegono, near Milan, and four days later the first to be built by Fiat took the air at Caselle, near Turin. Seen here with Macchi's chief test pilot, Guido Carestiato, are (left) A. G. Hobson, D. H. production liaison engineer and (right) J. G. Robinson, field service engineer. Ghost-powered Venom night fighters are also to be constructed in Italy.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HERE AND THERE . . .

Commando Investigations

OFFICIALS of the U.S. Civil Aeronautics Administration have been asked to co-operate in investigations to determine the cause of a recent series of accidents to Curtiss C-46 Commandos in Korea.

A.B.A.C.'s Vice-Presidents

LORD PAKENHAM and Mr. G. de Freitas, M.P., have accepted office as vice-presidents of the Association of British Aero Clubs and Centres. The president is Viscount Runciman of Doxford, O.B.E., A.F.C., who accepted office in July 1950, and another vice-president is Sir Lionel Heald, K.C., M.P.

M. Breguet Honoured

THE great French pioneer aircraft constructor, M. Louis Breguet, has been invested with the insignia of Grand Officier de la Légion d'Honneur. Apart from being chairman of the company bearing his name, M. Breguet is honorary chairman of the Union Syndicale des Industries Aéronautiques, the French counterpart of the S.B.A.C.

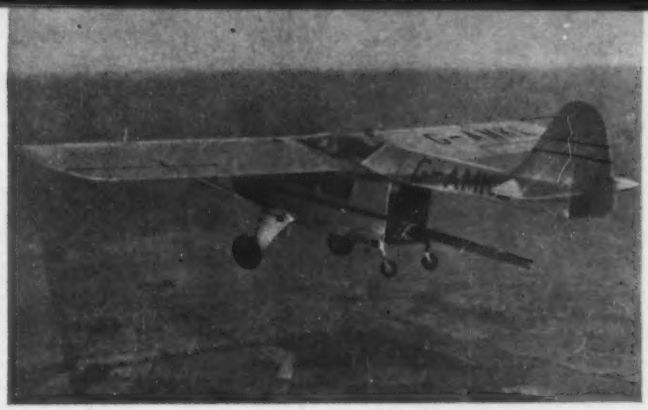
Production Potential

WORK has started on the erection of the steel structure for the new Rolls-Royce gas-turbine factory at East Kilbride, near Glasgow. Most of the site preparation has been completed, and it is hoped that the building contractors will shortly be able to make a start with the brickwork. Some of the space is likely to be ready for production before the end of this year. The biggest post-war enterprise of its kind in Scotland, the factory will employ some 4,000 workers.

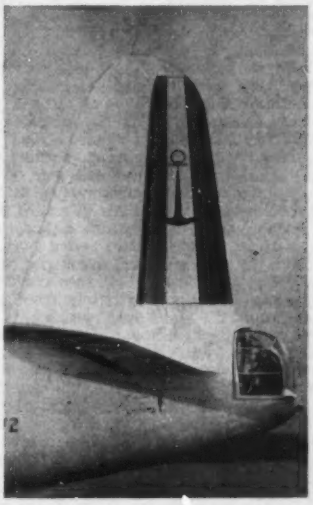
Jetville

LOCKHEED is the first company to move in at the $30,000,000 "jet centre" established by the U.S.A.F. near Palmdale, California. F-94 flight-testing began there last week, the aircraft being brought by road from the plants at Burbank and Van Nuys for final assembly and testing at Jetville. The value of Lockheed's new installation is estimated at $12,500,000; Northrop and North American are also scheduled to share this base, which is at present a stretch of desert.

THE TWENTY-TWO MILLIONTH British-made Goodyear cover recently left its mould at the Wolverhampton factory; it was a 17.00-20 aircraft tyre of the type supplied to B.O.A.C. Standing by are (left to right) Mr. H. Harben, A.Cdre. John Oliver (the company's aviation manager), and Mr. C. D. Heckman.



HANG-OVER: The Auster Ambulance/Freighter flies equally well when its rear loading door is removed. In this condition, an extended load can be carried provided that the c.g. conditions are respected, and that the cargo is firmly lashed to the numerous rings on the floor. This photograph shows how trials were recently conducted, utilizing three wing spars as the extended load. The pilot reported that the aircraft behaved quite normally.



UNFAMILIAR INSIGNIA: The French Naval Sunderland rudder referred to in the paragraph below.

Tricolour and Anchor

RECOGNITION students may be interested in the accompanying photograph of the rudder of one of the Sunderlands being overhauled by Short Bros. and Harland, Ltd., and destined for service with the French Naval Air Arm in West Africa. The rudder marking is the standard tricolour of French military aircraft but, contrary to British practice, the complete rudder is painted and the black anchor superimposed denotes that the aircraft belongs to a French Naval unit. The standard roundel on both sides of the fuselage also has a black anchor superimposed.

IN BRIEF

IT is announced that Sir John Woods, G.C.B., M.V.O., has been appointed a director of the English Electric Co., Ltd., and of Marconi's Wireless Telegraph Co., Ltd.

* * *

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., left London Airport on January 10th for a ten-week business tour of South Africa and Rhodesia.

* * *

B.S.F. 62: 1951, covering test requirements for vulcanised cellular natural-rubber sheet used as a sealing layer in self-sealing fuel tanks, has been published, at 1s, by the British Standards Institution, 24 Victoria Street, London, S.W.1.

* * *

Commenting on the loss of the Vickers Valiant, the Speed Development Co., Ltd., of Hove, Sussex, state that the fire-detection equipment developed by the company was not fitted to this aircraft. It will be recalled that an official statement said that "there was no fire-detecting equipment aft of the engine."

* * *

Some twenty careers masters from leading Public Schools recently attended a conference at Shell Lodge, Teddington—training-centre for Shell executives—to discuss boys' prospects in industry. In considering civil aviation, a visit was paid to London Airport as guests of B.O.A.C., Capt. "Jerry" Shaw accompanying the masters.

* * *

Mr. C. L. Chapman, chief development engineer of Venner Accumulators, Ltd., is now in the U.S.A. and Canada, with Mr. R. P. Mason (commercial manager), to meet world concessionaires for the firm's lightweight alkaline accumulators. Among the companies which Mr. Mason will visit is the newly formed Silvercel Canada, Ltd.

* * *

A new brochure gives details of the facilities available at the test-laboratories of Blackburn and General Aircraft, Ltd., Brough, East Yorks. Comprehensive equipment is provided for testing materials and structures, while mechanisms and electronic devices can also be checked. Blackburn and General Aircraft are in a position to undertake investigations for firms without such facilities.

HELICOPTER HISTORY

Mr. L. H. Hayward's Lecture to the Helicopter Association: Recent Jet-drive Designs

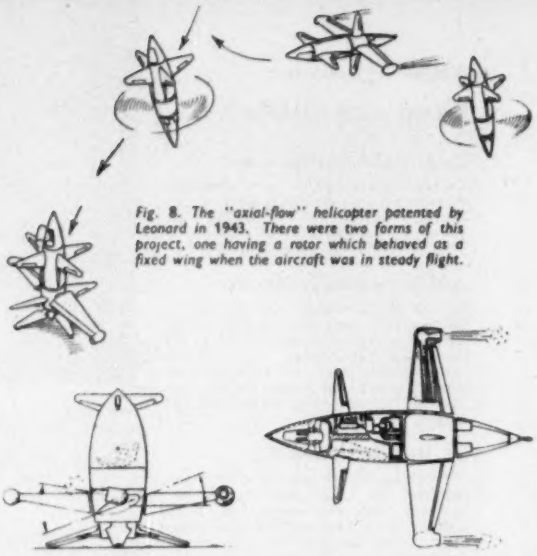


Fig. 8. The "axial-flow" helicopter patented by Leonard in 1943. There were two forms of this project, one having a rotor which behaved as a fixed wing when the aircraft was in steady flight.

ON Friday, January 11th, Mr. L. H. Hayward delivered to the Helicopter Association of Great Britain a paper entitled "A Review of Helicopter Patents." He described a number of historical experiments made up to about the beginning of the century; then, because helicopter patents are so numerous, he confined the remainder of his review to jet-drive developments. Last week we gave a digest which carried the story up to the middle of World War II; in this second instalment the remainder of the review is summarized. Mr. Hayward is patents engineer to the Fairey Aviation Co., Ltd.

SHOWN in Fig. 8 are three drawings from two American patents of 1943, filed by L. H. Leonard. The remarkable machine illustrated was intended to change its attitude through 90 deg after take-off: it had a fuselage supported upon the ground in an upright position by a landing gear retractable in flight to form a streamlined tail cone. Around the fuselage were four surfaces which could be regarded as either wings or rotor blades, with combustion jets mounted at their tips. The main difference between the two patents was that in one case these surfaces were stationary during horizontal flight, behaving as wings, while in the second patent they acted as rotor blades at all times during which the machine was airborne. Fins embodying control-surfaces aided stabilization during vertical flight and could be retracted into the fuselage as required. The patentee claimed that by operation of these control surfaces it would be possible to adjust the machine from a vertical to a horizontal flight attitude, and also to counteract the bearing friction of the rotor and thus prevent the fuselage from rotating about its longitudinal axis. The pitch of the rotor blades could be altered in flight as desired. This type of helicopter was known as an "axial-flow" type, the rotor airflow remaining axial in all conditions of flight.

Mr. Hayward then went on to describe a British patent filed in 1944 by a Frenchman, M. de Chappedelaine. Drawings from the patent, one of which is shown in Fig. 9, showed the arrangement adopted to extract the boundary layer from the rotor blades. The rotor, which was mechanically driven, was provided with a venturi ejector at the tip of each of its two blades, each venturi being ducted to create a depression within the opposite blade. The blade interior was vented to the surface by slots through which the boundary air was bled. The patentee claimed that his rotor was more efficient than one of normal design.

A British patent was granted to the Fairey company in June, 1944, in respect of a helicopter rotor driven by gas turbines mounted at the blade tips. The patent drawings (Fig. 10) do not specify any particular type of gas turbine, the one shown having an annular combustion chamber and a divided airflow, part of the flow being used for bearing cooling. Fuel lines and ignition leads were carried through the main spar of the blade. Both turbojet and turboprop units were shown in this specification.

Mr. Hayward then described a number of late war-time patents embodying free-piston gas generators, jet-drive units geared down to the rotor, rotors with telescopic blades and rotors with heat-exchanging jet systems.

He then discussed another of Stalker's many (and progressively more complex) jet-helicopter patents. In this 1946 design, air, compressed by centrifugal force, was ducted to the outer half of the rotor blade and exhausted through slots in the rear upper surface. Part of this airflow was taken past fuel injection nozzles and igniters before ejection through the slot. In the cross-section of the blade (Fig. 11) can be seen the flap over the ejection slot which controlled the outlet flow. The slot could be adjusted by this means to give a variable exit area for the hot gases from that part of the internal flow in which fuel had been burnt. The blade also incorporated a trailing-edge flap, seen hinged at lower right in the figure, for altering the cyclic pitch.

A practical patent of 1946, in the name of the Cierva Autogiro Co., Ltd., was of interest by virtue of the fuel system specified. A highly volatile fuel was to be used, delivered as vapour through the rotor hub and blades to tip-jets, a reducing valve being inserted in the supply line so to control the delivery pressure as to prohibit re-condensation of the fuel due to centrifugal compression. By the use of this system, it was stated that fuel atomizers would be eliminated, together with the high centrifugal pressures experienced in fluid-supply pipes in the rotor blades, while

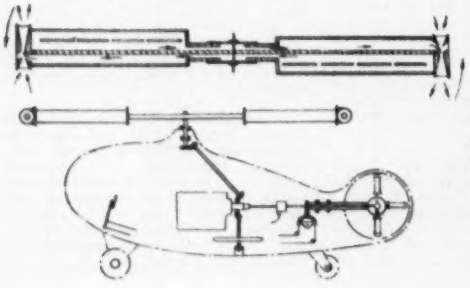
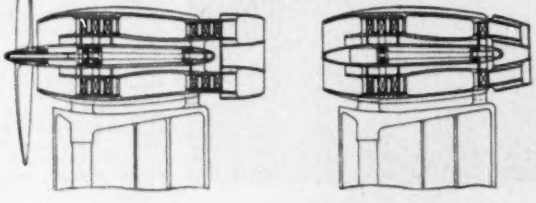


Fig. 9. (left). M. de Chappedelaine's design, embodying boundary-layer suction on the rotor blades.

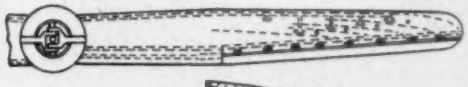
Fig. 10. (below). The tip-mounted turboprop and turbojet specified by the the Fairey company in a patent of 1944.



the use of a vapour as fuel would allow a shorter combustion chamber to be used, so reducing drag.

A jet-driven rotor was the subject of a Fairey patent of July, 1946 (Fig. 12). The mass at the blade tips was greatly reduced by feeding the tip orifices with a fuel/air mixture previously compressed in the fuselage. In order to reduce the fuel consumption, the rotor jets were switched off in flight, the aircraft being propelled by an engine-driven airscrew with the rotor autorotating. When the aircraft was to be used as a helicopter, the airscrew was disengaged and feathered, and the engine-drive transferred to a fuselage-installed compressor. This fed compressed fuel/air mixture to the hollow blades, within which were the combustion chambers and distributor vanes to deliver the efflux to the tip-jets. The fuel injection rate was varied with the pressure of the air delivered. The engine also drove a cooling-fan, part of whose output could be ducted to a directional nozzle at the rear of the fuselage. The main fuel supply could also be taken through a vapourizer (heated by engine exhaust) prior to introduction of the fuel to the compressor. Some of these arrangements may be seen from the accompanying drawing.

It was pointed out that helicopter designs employing a fuselage-mounted gas turbine passing its efflux to the rotor-blade tips presented a number of problems, owing to the high gas temperature required at the turbine and the consequent excessive heating of the rotor hub and blades. Further, heat dissipated in cooling these items was largely wasted and, as a result of the high temperature and low density of the rotor gas-flow, the blade section required to be larger than the aerodynamic optimum. The consequent



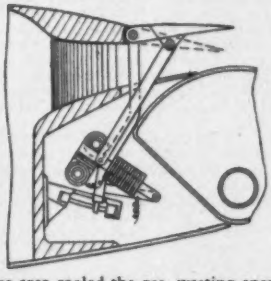


Fig. 11. The complex blade projected by Stalker in 1946; the plan view shows the arrangement of the fuel-injection nozzles in the outer part of the blade.

large blade-surface area cooled the gas, wasting energy, and various joints in the ducting presented their own problems. Turbines mounted at the blade tips solved most of these problems but, on the other hand, involved undesirable weight concentrations at the tips and, as a corrollary, introduced difficulties arising from gyroscopic reaction and blade inertia.

To overcome these various disadvantages, the Fairey company patented a low-pressure system in 1947, shown in Fig. 13. This incorporated a small compressor operating at a moderate temperature. The compressor delivery was divided, one part of the flow being passed through a heat-exchanger to the gas turbine, and the other being ducted to the propulsion jets at the rotor tips, small ducts within the blades allowing the desired blade cross-section to be maintained. This thermodynamic cycle was, from the point of view of efficiency, almost independent of compressor delivery pressure and of the temperature in the combustion chambers. The working fluid within the blades was simply hot air at quite a moderate temperature, while the jet-nozzle outlet area was manually or automatically controllable as desired. Exhaust gases from the turbine were directed on to a rudder to enable the aircraft to be turned about a vertical axis when hovering, while, as a safety precaution, the rotor-blade pitch was arranged automatically to change for autorotation whenever the compressor delivery pressure fell below a predetermined minimum value.

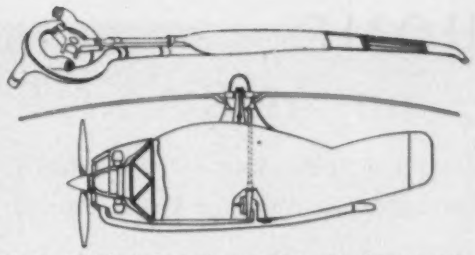


Fig. 12. The helicopter propulsion system patented by Faireys in 1946. The rotor jets are fed from a fuselage-mounted compressor, while an engine-driven airscrew is employed for forward flight.

In 1948, a patent was filed in the U.S.A. by H. F. Pitcairn, relating to an assisted-take-off/flight-refuelling apparatus. The patent consisted essentially of a subterranean chamber in which were housed fuel tanks and a length of flexible hose. This hose was coupled to the helicopter, which then took off carrying the end of the hose with it, fuel being passed throughout. The hose was then released at a predetermined height.

The final drawing shown in our precis of Mr. Hayward's lecture (Fig. 14) refers to a British patent of November, 1948, filed by the Autogiro Company of America. This concerned a control mechanism for jet-driven rotors, the chief feature being that a change in the operation of one jet influenced the operation of the other(s). In each blade tip was a suitable

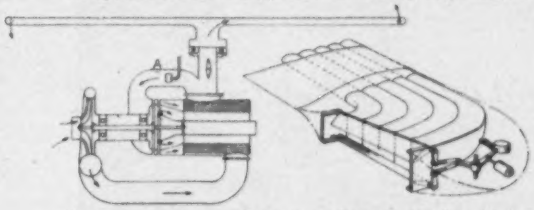


Fig. 13. The low-pressure-jet system developed by the Fairey Aviation Co., and patented in 1947. The principle is designed to overcome many rotor-jet problems by employing relatively low-temperature gas flow.

jet nozzle the fuel supply to which was provided with a shut-off valve. This valve was solenoid-controlled, the solenoid circuit being made and broken by a sliding contact at the rotor head which operated whenever pronounced leading or dragging of a blade took place. Thus, in the event of irregular operation between the jets causing variation in rotational speed of one or more blades, excessive movement between adjacent blades broke the solenoid circuit, closing the fuel entry valve for the jet on the "forward" blade. In this manner, a failure of one jet automatically shut off all the other jets, causing the rotor to go into autorotation and avoiding unbalanced drive conditions.

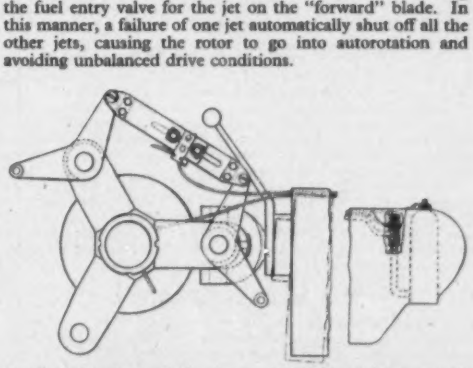


Fig. 14. An American control system in which the fuel supply to rotor-tip jet nozzle is dependent upon the angular position of each blade in relation to the other blades of the rotor.

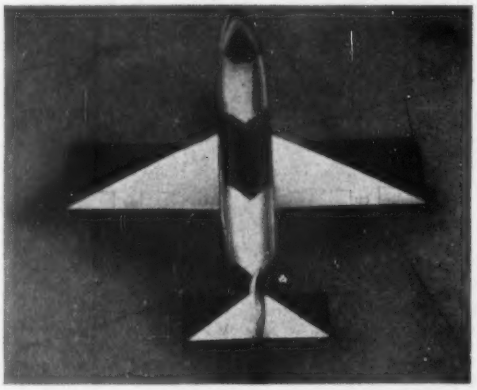
HOME on the RANGE

Some New Facts about Australia's Adder-powered, Radio-controlled Target Aircraft

In this photograph, the tricycle trolley from which the target takes-off is clearly seen. It bears a striking resemblance to that used for the German Arado Ar234 bomber in 1944.

A PHOTOGRAPH of Australia's first jet aircraft, for which no designation has so far been announced, appeared in our issue of December 14th, 1950, together with brief details. This aircraft was a piloted prototype of the radio-controlled target, also nameless, which is seen in the accompanying photographs from *Aviation Week*, our American contemporary. The original specification for a high-speed target was written by the Ministry of Supply, and the resulting design and development work has been carried out by the Government Aircraft Factories of the Australian Department of Defence Production at Fishermen's Bend, Melbourne.

A number of changes distinguish the drone from the piloted prototype, apart from the obvious replacement of the pilot by radio-control equipment. The original retracting tailwheel undercarriage has been replaced by a jettisonable trolley, rather reminiscent of some Arado experiments, which incorporates automatic brakes; these take effect as soon as the target lifts from the trolley. Upon completion of a flight, the target (provided it has not first been shot to pieces) is landed on a central skid; it has been necessary to provide this skid with a high-efficiency shock-absorbing system beyond the capacity of most normal undercarriages, in order to deal with the high landing speeds involved.



This plan view reveals the taper of the wing at the leading-edge root; this is probably inherited from the wheel-housing of the piloted model.

The power plant of this prototype drone is an Armstrong Siddeley Adder ASA.1, similar to that fitted in the piloted model, although the production engine is designed to be the expendable Viper. This latter engine fits into a much smaller space than the Adder, and delivers up to one and one-half times the Adder's 1,100 lb thrust, but has only a very short working life in consequence. The lateral intakes of the piloted aircraft have been replaced by a single flush dorsal intake, while the fuselage, which fits closely around the power plant and tail-pipe, is cooled by an airflow induced by the jet.

Aerodynamic features of note are the swept-forward leading-edge of the wing at the root (present on the piloted model, but only now visible in the accompanying plan view), and the fin, which has a raked leading edge and an increased area, compared with the piloted version. This latter point is unexpected, since removal of the canopy has reduced the side area forward of the c.g. The wings, of less than 20ft span, are detachable, and have constant thickness and chord. The plan view shows a trailing-edge flap of some 25 per cent chord, separated from the short-span ailerons by what appear to be perforated dive-brakes.

Markings on the fin leading-edge suggest that the main receiving aerials may be housed here, which may explain the increased fin root-chord.

The bizarre finish of the drone is intended to render it more visible when used at high speed for air-to-air interception firing. Although the target undoubtedly represents a considerable advance upon previous equipment, there seems no justification for the adjective "supersonic" which has been applied to it by some newspapers. In passing, background knowledge of the behaviour of small, fast aircraft under radio control is likely to have far reaching effects, as the introduction of the Martin B-61 Matador demonstrates.

At the time of writing, both the piloted and radio-controlled aircraft are undergoing ground-air control testing at the guided-missile range at Woomera.

AUSTRALIAN GHOST-OVERHAUL BASE

A GHOST-overhaul base is being set up by the de Havilland Company at Bankstown, near Sydney, in anticipation of the introduction by Canadian Pacific Air Lines of Series 1 Comets on their Sydney, Auckland, Fiji and Honolulu section next year. Ghost engines for the Sea Venoms recently ordered for the Royal Australian Navy will also be overhauled there and the manufacture of spare parts will be undertaken.

The establishment and, later, organization of the base are to be supervised by Mr. W. Isbister, manager of the engineering department of the Australian de Havilland company; he has spent some years in de Havilland factories in England, and was here recently with Mr. R. J. Moppett of the Australian company, who will also play an important part in the new project.

THE RADAR AWARDS

LAST week we referred briefly to recommendations made by the Royal Commission on Awards to Inventors in respect of claims in connection with radar development. In addition to Sir Robert Watson-Watt, who receives £50,000, the other radar research workers named, with the amounts they are to receive, are: Dr. E. G. Bowen and Mr. A. F. Wilkins, £12,000 each; Mr. L. H. Bainbridge-Bell, Mr. H. Larnder, Mr. G. A. Roberts, Dr. D. Taylor and Dr. A. G. Touch, £2,400 each; Mr. W. A. S. Butement, Mr. R. Hanbury-Brown, and Mr. P. E. Pollard, £1,200 each; Mr. R. H. A. Carter, Mr. H. Dewhurst, Dr. J. H. Mitchell, Mr. S. Jefferson, and Mr. B. Newsam, £750 each; W/C. E. J. Dickie and Dr. B. J. O'Kane, jointly, £500; Mr. P. A. Marchant, £250; Mr. P. A. Marchant and Mr. D. A. Weir, jointly, £250; and Mr. R. V. Whelpton, £250.

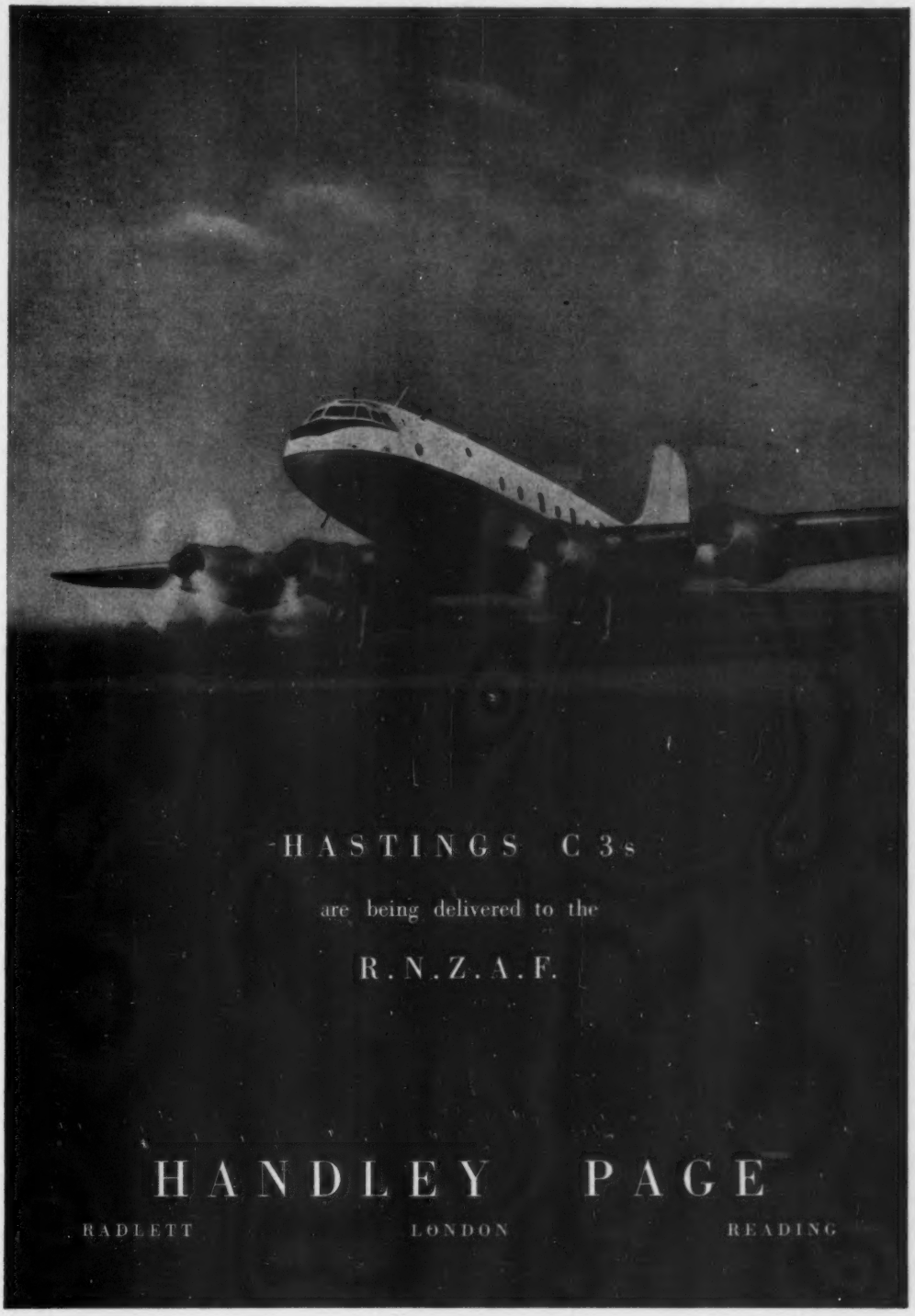
Several of the above names will be recognized as those of men still concerned with aircraft radio and radar work.

The awards are unlikely to be subject to tax. It will be remembered that the M.o.S. and the Admiralty have already paid some £200,000 in awards and compensation to other radar claimants.

DUTCH-U.S. REPAIR CONTRACT

FROM a Dutch Government source it is learned that the U.S.A.F. Headquarters at Frankfort reported earlier this month that a test contract with the Dutch Avio Diepen concern for the overhaul of C-47s has yielded satisfactory results. Similar contracts are now likely to be entrusted to other Continental firms. In the past, aircraft in need of major overhaul have been shipped back to the States, an expensive arrangement for the U.S. taxpayer.

The first C-47 overhauled by Avio Diepen was recently returned to the Rhine-Main Air Base, and others are to follow.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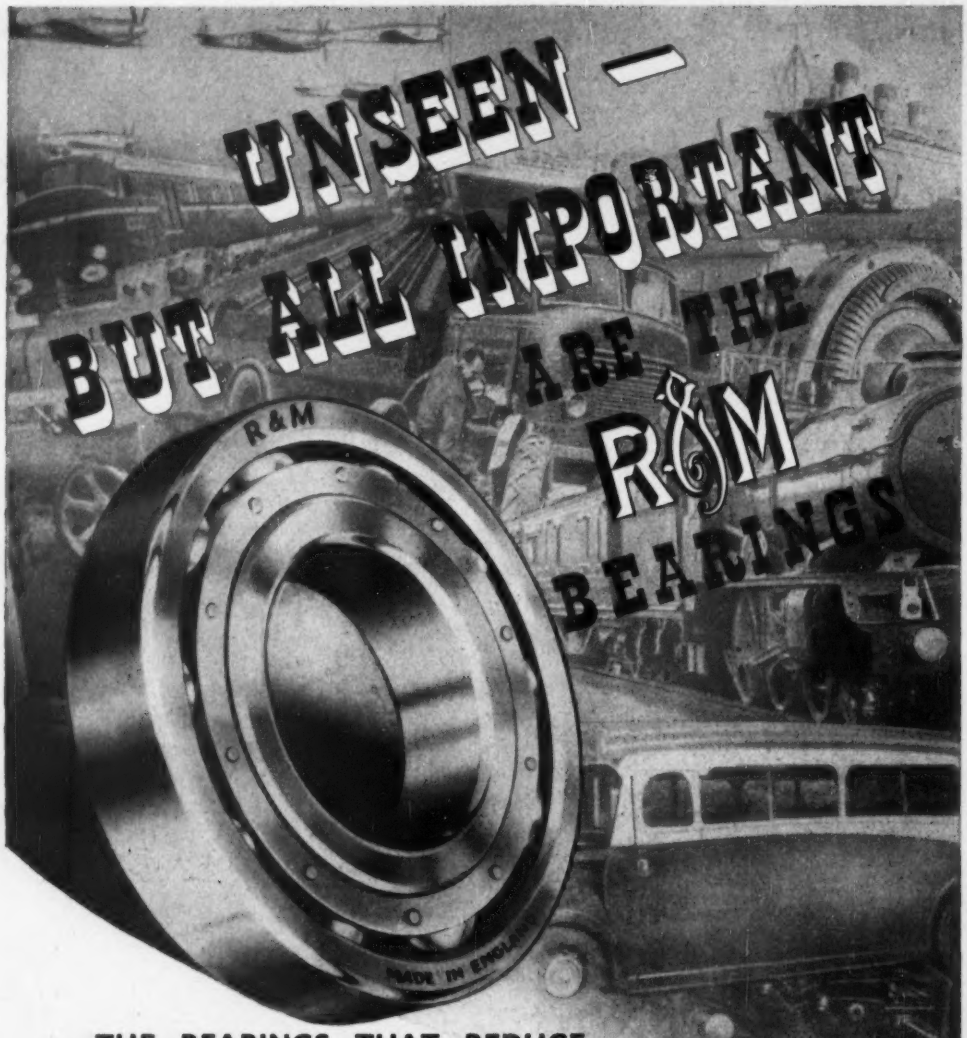

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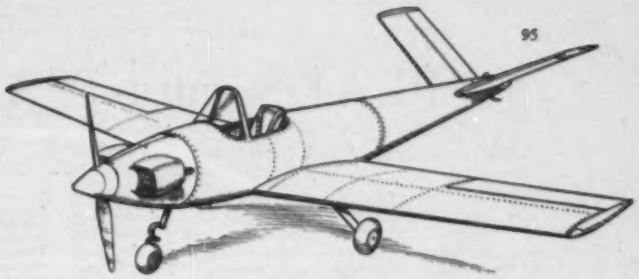


FIRST let us assume that flying, *for flying's own sake*, is a thing to be encouraged. Then, having done so, we may go on to consider the odd fact that there is just no vehicle designed for letting people fly themselves cheaply.

In every country, people lead interesting lives thinking up ever bigger, better, more complicated and more expensive aeroplanes, and yet they no more think of *owning* an aircraft than they do of sprouting wings. In fact, probably 99 out of every 100 of the world's aeroplanes will eventually be paid for by the taxpayer, who is in consequence left too poor to buy even half a one for himself.

One of the chief reasons for this state of affairs is the complete lack of a cheap, mass-produced aircraft. By "cheap" we mean a machine which can be marketed for under £500. The cynical may remark, "Why not £100?"; but there was something approaching a hundred-pound light aircraft in 1939 and there ought to be a five-hundred pounder today. Let's have a look at it.

Firstly, we must go about the business in the right way. We cannot take a present-day private-owner aircraft and go through it with a hacksaw and screwdriver until it is "simple." Our machine must be an efficient integration of mass-produced parts, with cost coming second only to soundness of design. The only country where mass-produced cheap aircraft can be found is, oddly enough, France, and even there people persist in sticking to time-honoured methods of construction which rule out the possibility of making anything really useful. On the other hand, the United States, while leading the world in lightplane structures, has so far been rather lukewarm towards any private-owner type which did not combine the furnishing of a Cadillac with the equipment of an airliner. This is becoming ever more clearly marked. As for the rest of the world, private flying is so hedged in by regulations and so overshadowed by professional flying as to be something less than a side-line. Small numbers of nice little aircraft are built in Czechoslovakia, Italy and the United Kingdom, but the number of licence-holders in these countries is not one-tenth of what it ought to be and compares most unfavourably with the number of private pilots in more fortunate places like Brazil and Southern Rhodesia, in spite of the fact that the latter countries are supposedly less developed, and have little industry of their own.

Conception Outlined

Before getting down to details, it may be remarked that our attempt cannot aim at more than the building of a cheap lightplane: we cannot now reasonably expect any great changes in things like fuel costs or landing fees. The accompanying sketch shows the type of thing we have in mind. It looks quite normal, and is quite normal, except that there is, at far as we know, nothing like it. The overriding factors governing the study have been that (*a*) The structure has been kept all-metal; (*b*) the stressed-skin monocoque principle has been carried to extreme; and (*c*) the number of parts has been cut to an absolute minimum.

What about power? It takes a long time to develop a good piston engine, even a very small one, and the best bet looks like one of the highly developed American flat fours. The 65 h.p. types are quite husky enough for our purpose; or there is the little McCulloch flat four, used in American radio-controlled targets—just the sort that is wanted, and if a way could be found to increase the engine life without greatly raising the first cost it might be ideal. When we have our engine, we merely mount it on the nose, using a few steel tubes and rubber blocks, and then let it drive the simplest possible airscrew.

Turning to the main structure, wings are usually very expensive, even on a primary glider, simply because people will make them out of hundreds of tiny bits. At the risk of blowing America's trumpet to excess, we may perhaps recall the example given us by the Republic Corporation, whose little Seabee amphibian had just the sort of wing we are advocating. After the first few had been built, someone had the great idea of cutting down the number of wing parts from the *n*th power of ten to a couple of dozen. The secret was a clever combination of torsion-box design and corrugated skin.

Our own little study has a hefty top-hat-section spar locating both top and bottom surfaces of the one-piece wing sheet. The latter has no double curvature, has constant section, and could very quickly be turned out by a Sheridan stretch-former. It must, of course, be of fairly heavy gauge. The ribs, of which there are but three on each side, are simple pressings divided into nose and rear sections by the spar, while the wing-tips are shallow pressings. The whole thing is held together by rivets, unless it could be more cheaply Reduxed, as is the remainder of the structure.

Fuselage Simplicity

Our fuselage is really a cylinder and cone, both rolled from heavy sheet. The only internal members are a keel, a heavy angle-section bulkhead locating the wing spar, and light angle-section rings at the fire-wall and at the joint between the cylinder and the cone. Further stiffening is provided by the cockpit floor, which is attached to the cylindrical section along each side above the wing.

As regards the undercarriage, we can eliminate the usual precision engineering if we can accept a reduced performance from it. The actual "springing" here is by a simple undamped leaf spring à la Cessna. We rather like the Fairey Junior's brakes : a string of friction cubes threaded on a wire and wrapped round a brake drum integral with the wheel.

Little more need be said. The greatest drawback to this sort of structure is that any damage is likely to be difficult to repair. However, this is partly counteracted by the fact that such a structure is not easily damaged. One could quite easily taxi into a hedge without making a dent, and our airframe is quite free of "no step" notices.

The whole design is such that, while the first prototype and tooling will be costly, mass production will be very simple and will lend the product great accuracy, interchangeability of parts, and low cost. If ever flying is to become popular in the sense that cycling is popular, then this is the only sort of machine that can make it so. W. T. G.

TECHNOLOGICAL EDUCATION

THE London and Home Counties Regional Advisory Council for Higher Technological Education periodically publishes a comprehensive summary of special courses in higher technology available in the London Area. Bulletin No. 4, covering the period of Spring and Summer, 1952, announces an unusually large number of courses available at twenty-five colleges and institutions. While none of these courses is of a purely aeronautical nature, many should be of value to technicians in the industry. In most cases, no hard-and-fast rules are laid down governing admission, provided the applicant is in a position to make good use of the course.

The Council's Third Annual Report is also to hand, and shows Higher Technological Education to be in a very healthy state. Both documents are available from the Secretary of the Council at Tavistock House South, Tavistock Square, London, W.C.1. The Bulletin is priced at 1s. 6d.

PEAKS and PARACHUTES

Some Thoughts About Everest

By BRIAN J. HAIMES

IN view of the wide interest aroused by the Mount Everest Reconnaissance Expedition—and particularly by Mr. Eric Shipton's reports in "The Times"—the suggestions made in this article are apposite. As commandant and chief instructor of the Army Air Transport Support School, India, the author was responsible, in 1946, for a series of trials involving the parachuting of troops and supplies on dropping-zones higher than any previously used.

ASK a climber why he wants to climb Everest and he is likely to answer in Mallory's words, "Because it's there"; ask him why he doesn't use some of the modern aids to painless mountaineering and you are likely to be covered with scorn and derision. Those whose interests lie in the particular form of misery known as climbing prefer the Spartan method of travel, with ropes and ice-axes as their major concession to civilization; and any whose suggestions seem to cast doubt on their vigour are shown the door.

I don't know why they must always choose the very hardest way; perhaps it's just rugged individualism, but I have sometimes pondered on the help which aviation techniques could give to lighten the drudgery of some of the major mountaineering expeditions, and the prospective Everest attempt is a case in point. The recent reconnaissance expedition has been seeking a new route to and up the mountain because of the many difficulties inherent in the traditional one.

Whichever way one goes once the party is assembled in India any Everest expedition falls into two distinct parts. The first is a transport problem of getting climbers, porters and stores on to the Tibetan plateau at some 14,000ft above sea level, and the second, the genuine climbing, hardly begins until one reaches the Rongbuk Glacier at some 16,000ft. In the past every member of the party, climber or not, has had to make the long hard trek to the north on foot or by mule—and it is debatable whether one is better off riding or not. The route stretches through the uncomfortably humid jungle of Sikkim and then over the equally uncomfortable mountain passes which are windswept and cold at the best of times; and every pound of food and equipment has to be carried by man or mule for every one of those weary miles uphill before the mountain is even reached. This process is called acclimatization.

What enormous drudgery could be avoided if only one Dakota were to sidestep this complicated and tiring transport job and drop all the stores by parachute at the base camp!

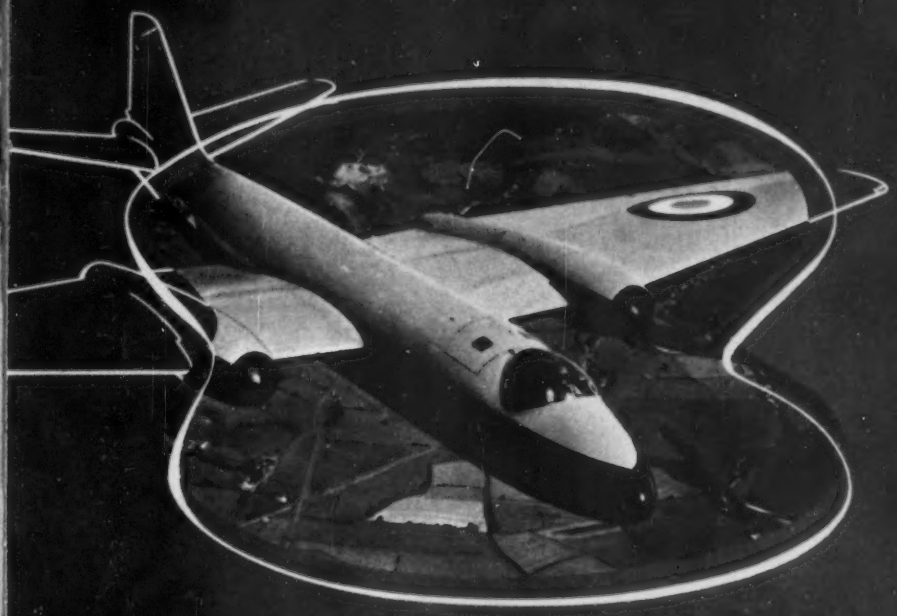
To some people this sounds like an excessively intrepid and death-defying operation—the dropping-zones would be too high, or the payload would have to be too small to be useful, or the mountains would give the pilots no room to manœuvre, and so on. Actually, all this is nonsense. Not much has been tried in the way of high-altitude dropping in mountainous country, but what has been done has mainly been in the Himalayas, although little seems to be known about it. In the summer of 1946, G.H.Q. India was interested in the possibility of parachuting men and stores safely and accurately on to high-altitude dropping-zones and it was thought that the rarefied air might make the rate of descent too high for safety. The Air Transport Development Centre, India, carried out trials on the ski slopes of Killanmarg, a 13,000-ft mountain above Srinagar, the capital of Kashmir, and 150lb dummies were dropped from Dakotas, using the ordinary X-type man-carrying parachutes of 28ft and 32ft diameter. With the dropping-zone at sea level the rate of descent of these canopies is approximately 18ft/sec.

To the surprise of some people concerned in the Kashmir trials, the rate of descent was found to be no more than 21-23ft/sec, the larger canopy having, in general, the slower fall. This implied so little extra risk to the load—man or container—that it was considered quite safe for troops, and, of course, the position as regards supplies is much simpler. During the Burma campaign the loss of parachuted stores, from all causes, was less than 2 per cent and there is no reason why this should be exceeded on dropping zones even as high as 20,000ft. The increased rate of descent, calculating at roughly 3ft/sec for each 10,000ft rise in altitude, can easily be overcome by using 32-ft canopies or by slightly reducing the load per parachute to, say, 120lb. My arithmetic was never very good, but if in doubt one could always use some of the 60-ft Irving bedspreads.

The actual dropping is, of course, by no means the whole story—there is also the tricky little matter of getting the aircraft into position and out again amongst all those very stony mountains and their vicious gusts of wind and weather. The practicability of flying laden Dakotas in and around the Himalayas at the requisite altitudes and places is also sometimes doubted. Those who read Capt. Massey's recent article (*Flight*, November 16th, 1951) on the Himalayan Airlift to Gilgit and Skardu should have no further qualms when they consider the reliability of his service. That airlift began somewhere about the beginning of 1948 and has fully proved itself. Even earlier, however—in October, 1946—the pilots of No. 3 Parachute Training School, one of the most versatile and yet least-known groups in the R.A.F., had pioneered the route when they dropped a complete radio receiving and transmitting station by parachute to Gilgit. Their normal job consisted of trundling endlessly round and round at low levels, training Indian parachute troops; but they turned to the tricky technique of mountain flying without hesitation and put every single item—radio valves, steel mast sections, fuse boxes and even distilled water in jars—accurately on to the tiny strip. Despite the boulder-strewn nature of the D.Z. the only loss was one jar of water, which broke when its container swung against a rock. All this was indeed proof of the reliable dropping which can be done even in a desolate valley with high ground within 500yd of the D.Z. on all approaches. There are, of course, the minor snags inherent in all hill-country flying.

The bases for any such operations on Everest exist in the shape of sundry former U.S.A.F. airfields in Assam, built for the aircraft flying the Hump and all close enough to the Himalayan foothills to enable a useful payload as well as fuel reserves to be carried. Although it is six years since they were in regular use most of them are still usable, having been strongly and lavishly built in inimitable American fashion. Even the purists of mountaineering will surely not object to having their stores delivered from there to the base camp by air, any more than they object to having it carried by ship to Calcutta; and I look hopefully to the day when a British aircraft and crew, displaying their usual versatility, will assist at the conquest of the highest peak on earth.

Everest under a heavy snow mantle and enjoying one of its rare calms—the familiar snow-plume that streams from the summit is absent.



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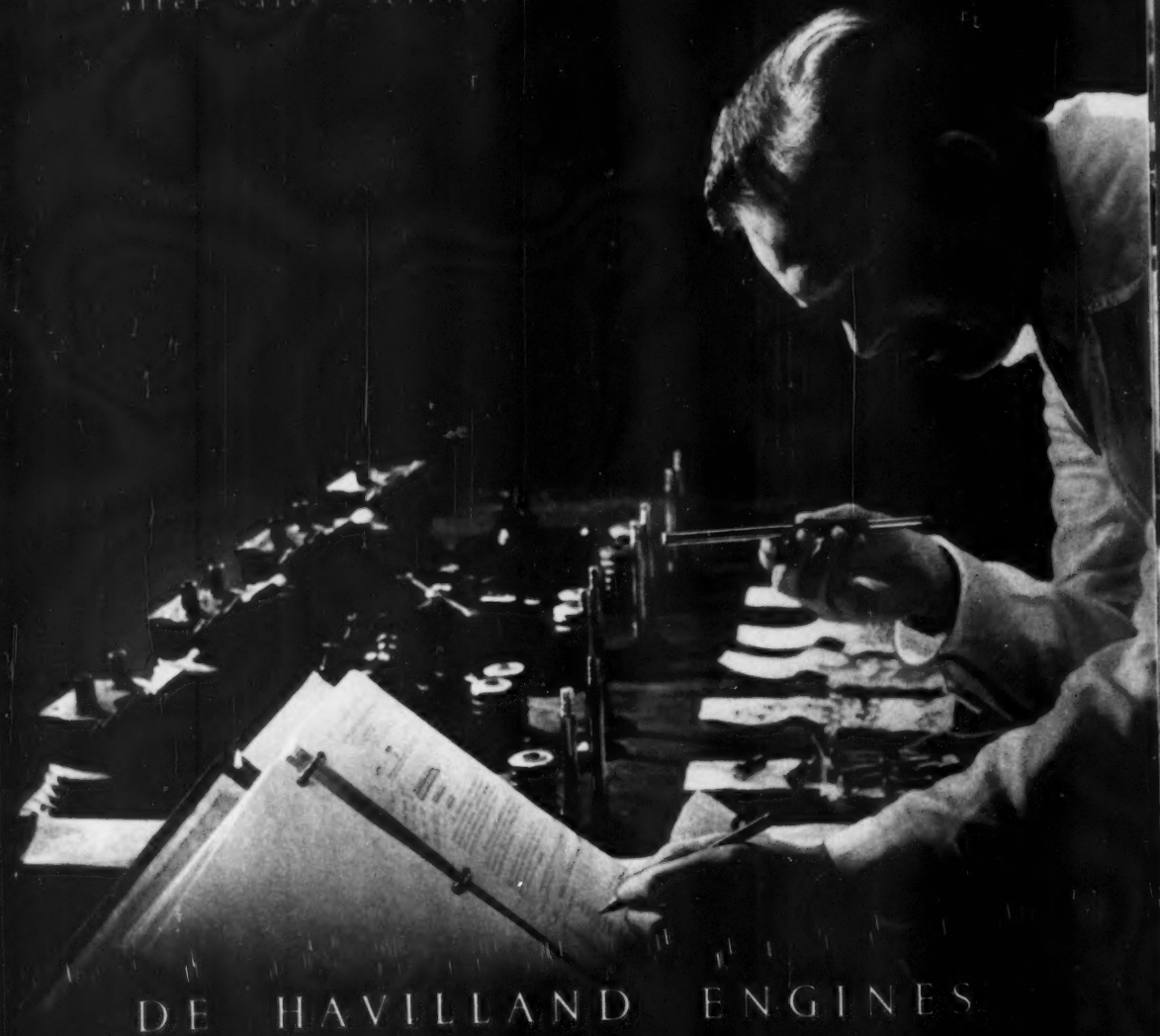

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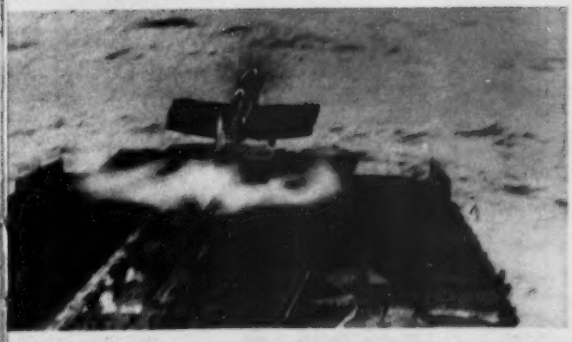
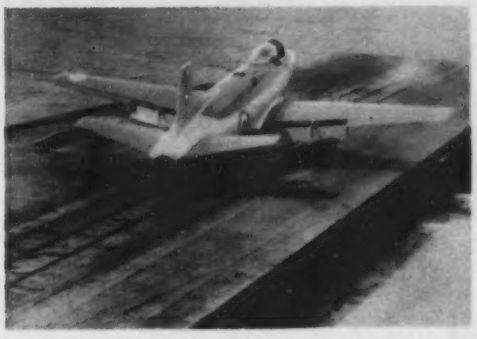
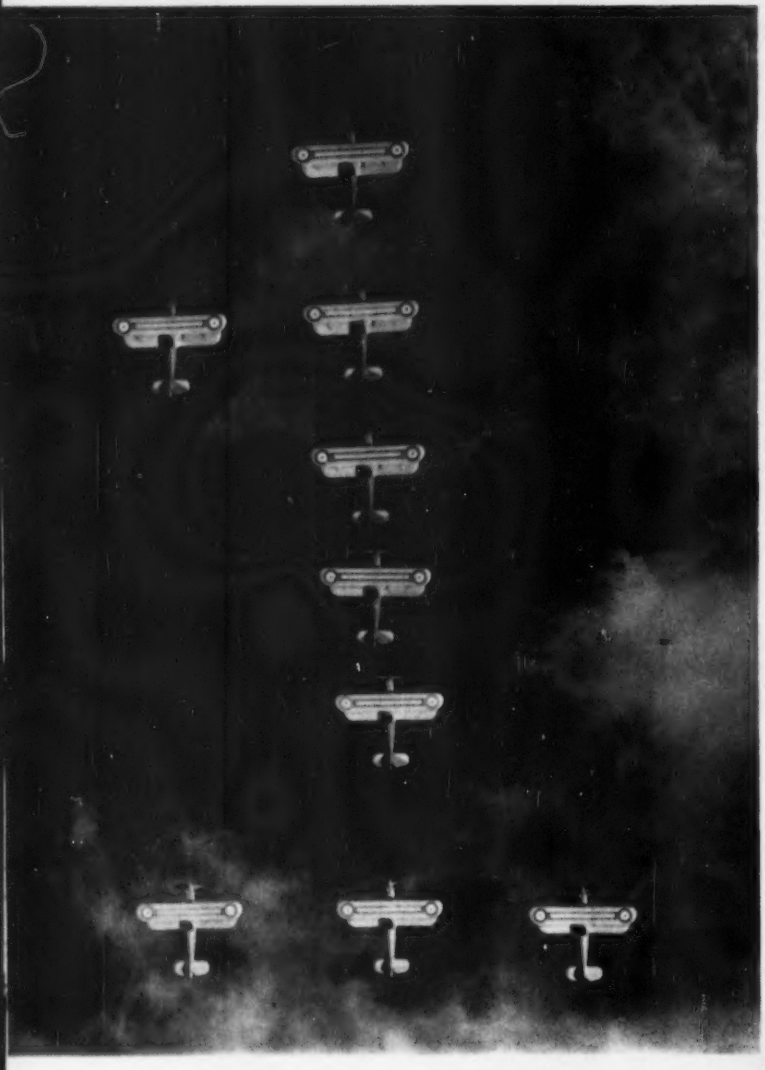
STEAM LAUNCH

The Navy's New Catapult in Action

AN account of the development of the Royal Navy's new steam-operated catapult appeared in our issue of January 4th. Only one example of this type of catapult is so far in use, installed in H.M.S. *Perseus*. From this carrier, trials have been taking place for over a year, deadweights being employed for the first launches (a similar method was used by the Germans when calibrating their flying-bomb ramps). Unpiloted aircraft were next shot off, special precautions being taken to curtail their flight. In spite of such measures, however, one such "pruned" specimen circled *Perseus* for four minutes, to the consternation of those on board. The accompanying pictures, from an Admiralty film—parts of which were included in a recent British Movietone newsreel—show (reading anti-clockwise around the page) the launches of a Sea Vampire; a "pruned" Seafire; a Firefly; two stages in the launching of an Attacker; a Sea Hornet; a Sturgeon T.T.2, the heaviest aircraft tested; and an Avenger. Several of the photographs appear to show a towing bridle in use, while escaping steam is prominent in others; the Firefly, incidentally, displays airscrew vortices. As explained in our earlier reference, the catapult utilizes steam from the vessel's main boilers, and depends upon the propulsion of a piston along a slotted cylinder; a "novel sealing-device" renders the cylinder steam-tight.





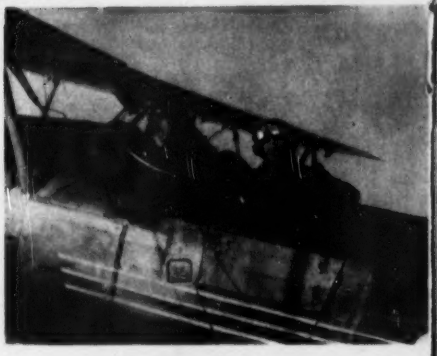


TWENTY YEARS AFTER

The Hawker Hart Goes Back on the Job for a Day

By JOHN YOXALL

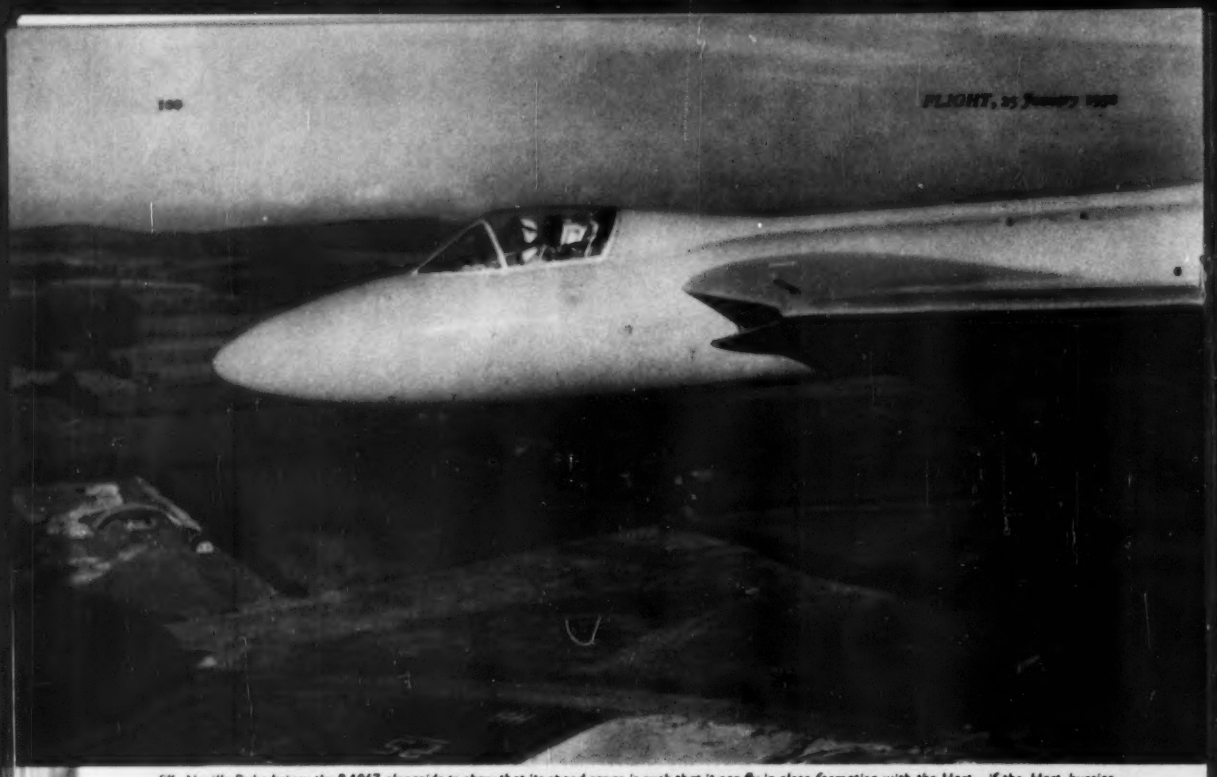
THEN AND NOW: On the left is the 1933 formation of Hawker Fury biplanes, led by S/L. Spackman, who retired in 1950 as an air vice-marshal. On the right S/L. Ellacombe and his pilots show that No. 1 Squadron has lost none of its skill, despite a nearly trebled speed. Below, Frank Murphy and the author are seen in the Hawker Hart ready for take-off from Langley.



THE opportunity of a day out in G-ABMR, Hawker's private Hart, in which I first flew in 1932—so what happier thought than to revisit No. 1 Squadron at Tangmere and attempt to repeat a "1" formation photograph taken some 19 years ago?

How quickly was the illusion of the passage of time defeated! Bill Bailey of Hawkers was still there to wind up the Rolls-Royce Kestrel and, on starting, the same curl of blue smoke (or one very like it) came from each exhaust bank, albeit the exhaust fumes from modern fuel smelt a trifle different.

In the air the familiar flap of the port tailplane bracing wire was still apparent, a trifle more so, maybe, and it was not long before one remembered that the pulsating slipstream was considerably less savage on the starboard side of the rear cockpit. Up front, Frank Murphy, Hawker's chief production test pilot, coped manfully with an erratic



S/L. Neville Duke brings the P.1067 alongside to show that its speed range is such that it can fly in close formation with the Hart—if the Hart hurries.

TWENTY YEARS AFTER . . .

slow-running device: on arrival at Tangmere we had to make what he called a "Camel" landing—switching on and off on the approach—and even then making an unintentional stop on the perimeter track while Meteor 8s and N.F.11s made the old Hart rock violently as they swept scornfully past their elderly mother-in-law.

After a sojourn in the briefing room to discuss ways and means of getting the new photograph of the squadron in a "1" formation we took the air once more. The biggest snag was the absence of any R/T. in MR, and another was the probable inaccuracy of the Hart's altimeter. It was therefore decided to have a Meteor 7 doing a sort of policeman job—flying at the same level as the Hart to pass on the exact height to the formation, which would then overtake (or undertake) from directly astern, flying some 900ft lower.

A consideration of conditions in the Hart's rear cockpit for the next 40 minutes is entertaining. To obtain a vertical picture one had to lie prone on the floor, the weight of the chest, head and camera being taken on the points of the elbows. Because of the much greater speed of the Meteors and the fact that from the inside of the fuselage they could not be seen approaching, the camera had to be kept ready and sighted the whole time. All this with ungloved hands in a 170 m.p.h. wind at a temperature of minus five centigrade. I do not remember the previous effort being so strenuous and uncomfortable—perhaps while MR has remained young I have grown a trifle older.

The squadron having made its agreed four passes below, the next problem was to shut down the cover over the camera

(Left) Makers of the "1"—and the policeman (see text): Left to right: Sgt. F. J. Fry, F/O. W. E. Willis, Sgt. P. J. Izzard, S/L. J. L. W. Ellacombe, D.F.C., F/L. R. W. Bunyan, A.F.C., F/L. D. P. F. McCaig, F/O. D. J. Seward, F/L. M. E. S. Evans, Sgt. R. L. Black. On the right: Bill Bailey "winds up" G-ABMR at Langley. The modern practice of tying-down the rear wheel did not obtain when the Hart was a baby.

The Percival Sea Prince fitted with Alvis Leonides engines

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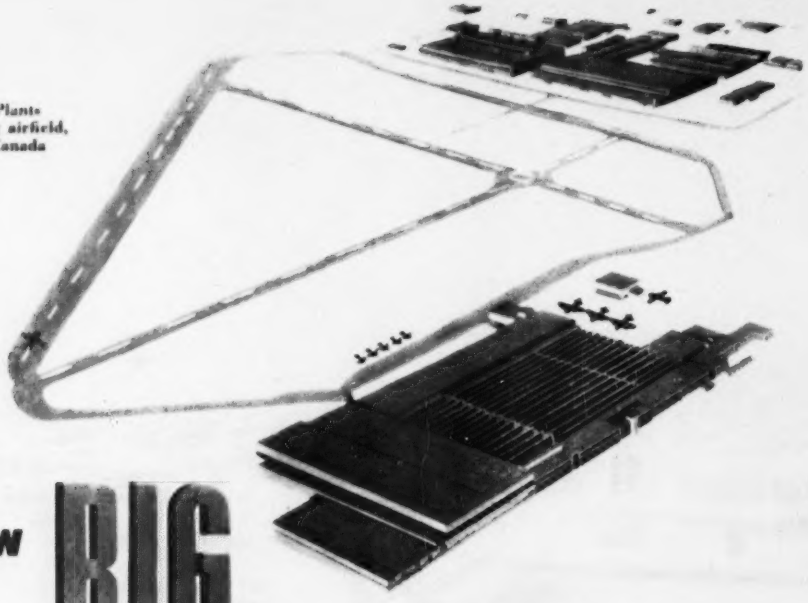

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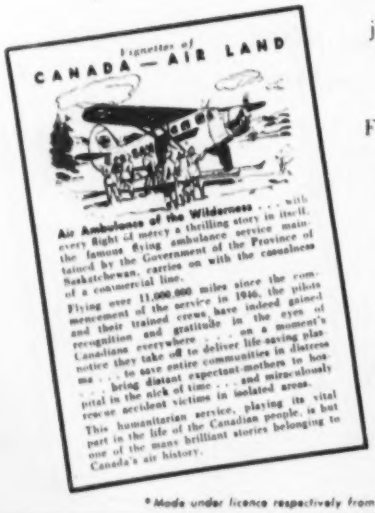

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TWENTY YEARS AFTER . . .

hole—a feat of strength—and to get back on to the seat once more. The latter was rather more than a problem and, for quite a while, appeared to be an impossibility. I effected it eventually by turning over on to my back, sliding forward under the pilot's seat and then pulling myself up by gripping the front edge of the seat in the gunner's compartment.

At last! A sigh of relief and one could sit back and take life quietly on the return ride to Tangmere. But could one? A mere speck in the distance instantly resolved itself into the Hawker P.1067, which shot past and crossed in front of MR. As we flew into the efflux of the Rolls-Royce Avon the old Hart staggered as if hit by a giant sledge-hammer. The P.1067 does not, however, always fly like that. To prove it there and then, S/L. Neville Duke, with the aid of a little flappage, came alongside MR and stayed in formation for some two minutes—grinning at us from the comfort of his enclosed and warmed cockpit while we battled on in a 190 m.p.h. icy gale. Then he left us and made a pass across Tangmere, to zoom and climb nearly vertically into invisibility. If the Hart felt rather like 1066 and All That while the 1067 was alongside, even the Meteor 8 pilots had to admit that Duke's speed and climb was something to be wondered at.

A comfortable lunch with S/L. Ellacombe in the mess, and a pleasant journey at cruising revs back to Langley, where MR lives, ended a memorable day.

By the way, the superstitious, may be interested to know that G-ABMR, which has never hurt anyone in its long career, was No. 13 off the Hart production-line.

ESCOPETTE PULSEJET

A Compact, Powerful Unit: Its Background History and Working Principle

VISITORS to the last year's Paris Show flying display will recall the impressive, if ear-shattering, performance put up by the little Emouchet glider with its novel array of six Escopette Pulsejets. This unit has since been subjected to an extensive programme of trials, in the course of which over 200 flights have been made on two sailplanes, one fitted with four and the other six pulsejets. Hitherto, the Escopette has been studied primarily in the light of its capabilities in the low speed-range, where fuel consumption (at 1.8 kg/kg/hr) is particularly good. Now comes news that SNECMA are developing a number of higher-powered models for use at substantially greater speeds. As we shall, therefore, undoubtedly be hearing more of this unconventional power unit it seems timely to offer a brief history of its origin and explain the principle on which it works.

In 1670 Huygens discovered the basic functional principle of modern pulsejets, namely, that sudden evacuation of air from a cylinder will produce an atmospheric depression inside it; in piston engines this is known as the Kadenacy effect. Huygens described a propulsive machine working on this principle with the aid of gunpowder, but it was not until the dawn of the twentieth century that the first working application of the "pulsating" combustion-chamber appeared. These engines made use of Huygens's depression effect to permit successive refuellings of a chamber in which combustion at approximately constant volume

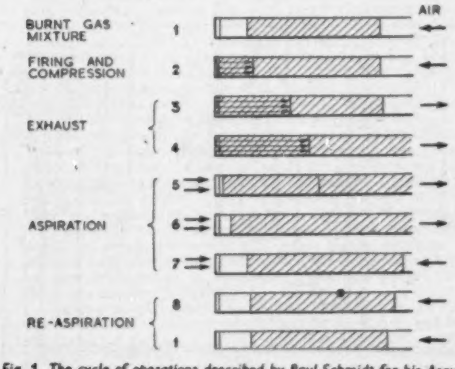


Fig. 1. The cycle of operations described by Paul Schmidt for his Argus-type pulsejet, to which the Escopette is basically similiar.

This photograph shows the method of installation of six Escopette units on the Emouchet sailplanes which are being used for the initial experiments. The dry weight of each pulsejet, with equipment, is 4.8 kg. Maximum static thrust is 10 kg.

was taking place. In this latter respect pulsejets are related directly to piston engines and differ from turbojets and rocket motors, in which combustion continues at constant pressure.

Holzwarth, in 1908, began to study a chamber, with automatic valves, feeding a gas turbine. In 1909 Marconnet was working on models which were very similar to the modern Escopette. As early as 1910, Caravodine built a gas turbine comprising a combustion chamber without pre-compression and giving an output which would be considered acceptable even today. Esnault-Pelterie also played an important part in these experiments.

Arising from these early studies, many investigations were made in various countries around 1930 but only those of Paul Schmidt resulted in a successful production model, later to become the Argus unit in the V.1 flying bomb. A passage from one of Schmidt's memoirs will serve to describe its principle of operation, which, incidentally, is almost identical with that of the modern Escopette (Fig. 1 is a schematic diagram showing the various phases of operation):—

"The main tube is provided with an inlet valve for combustible air. This valve [represented by a double line in the diagram] allows the fuel/air mixture to enter and prevents the return of the exhaust gas after the mixture is ignited, that is to say, during the generation of pressure inside the tube. At the top of the diagram the tube is shown at the end of a cycle; near the inlet valve is a charge of fresh mixture. In the remainder of the tube there are burnt gases from the previous combustion, with a body of air near the outlet orifice. The second illustration shows the stage immediately after ignition. Small arrows indicate the effect of pressure due to the combustion; this effect takes place very rapidly so that the gas column in the tube is pushed towards the rear, as shown in the third and fourth illustrations. Due to inertia, this movement continues even after motive pressure has ceased. The depression which is then set up in the tube, particularly near the valve, draws a new column of mixture into the tube (as indicated by the arrows in stages 5, 6 and 7).

"Air also enters the tube through the exhaust outlet (Schmidt's 're-aspiration') and is forced out again in the next cycle. Thus the tube functions at pre-determined resonance frequency. Not only is there an automatic intake of fresh air, but also, automatic ignition takes place at high combustion rates." It should be noted that

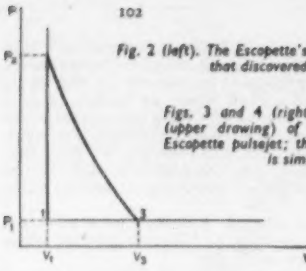
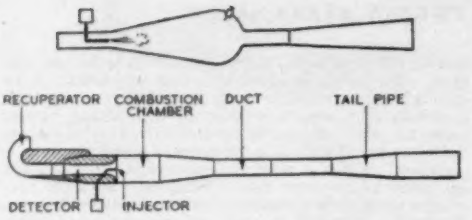


Fig. 2 (left). The Escopette's thermodynamic cycle is that discovered by Lenoir.

Figs. 3 and 4 (right). The Marconnet unit (upper drawing) of 1909 and the modern Escopette pulsejet; the principle of operation is similar.



ESCOPETTE PULSEJET . . .

there is no actual explosion, but rather a high-speed combustion of the order of 30 m/sec.

Thermodynamic Principle.—The thermodynamic cycle is that used by Lenoir in his gas engine which functioned without pre-compression. Ignition occurred during the period of induction. As illustrated in Fig. 2, this cycle comprises an important increase in pressure at constant volume, followed by an adiabatic expansion down to the inlet pressure. It has been calculated that the maximum pressure attained can reach seven times the initial pressure, P_0; the theoretic efficiency under these conditions being 28 per cent. In point of fact, the pressure attained is actually less because of the width of the openings of the combustion chamber and because the fresh charge is incomplete, the combustion being relatively slow. It is of the order of two atmospheres, or even less at smaller throttle-openings.

Propulsive Efficiency.—The thermodynamic efficiency of a pulsejet is extremely low, but it is still able to retain its place as a power unit because its propulsive output is relatively high. This is due to the fact that each discharge is also followed by the induction of a certain volume of air into the exhaust end of the tail-pipe. This air is then expelled at the next successive combustion.

Thus the kinetic energy produced is applied to a larger mass of air, which, although having the effect of lessening the exit-velocity nevertheless increases the momentum (and therefore the thrust) of the discharge gases.

Details of the Escopette.—The Escopette is a pulsejet of the Marconnet type (Figs. 3 and 4). It has no inlet valves and gas movement is regulated only by varying the dimensions of its duct. It comprises the following parts : a detector, combustion chamber, main body or duct, tail-pipe, recuperator, fuel injector and igniter plug. The detector is the name given to the intake unit, which has the general form of a venturi with a bias towards the passage of fluid in one direction only. Although outwardly it appears to be a simple component, development of the detector has, nevertheless, necessitated numerous tests and constitutes the most original feature of SNECMA pulsejets. Apart from eliminating the need for mechanical valves it also has the following advantages. Having no precise frequency of its own it can be adapted to harmonize with the main apparatus; it has a long life; fuel injection is easily made into the detector inlet opening; and a good combustible mixture is obtained even from continued injection at low pressures.

Counteracting these advantages, however, is the fact that the detector is not airtight and at each cycle produces a considerable back-pressure. As this back-pressure exerts itself in a forward direction, a curled "walking-stick" tube called a recuperator and shaped something like the cup of a Pelton turbine, is provided to reverse this movement. Its effect is to increase the output of the power unit. There is actually a gap between the recuperator and the detector to permit the entry of "induction air."

The functions of the body and tail-pipe are similar to those of normal pulsejets. The igniter plug located in the combustion chamber is only used for starting, as in normal running the re-igniting of successive charges is automatic.

The Escopette operates on petrol of any octane value, injected at pressures varying from 0.3 to 1.4 atm. At fuel-pressures outside these limits the unit will not function. Thrust varies from 3 to 10 kg at consumption figures which can be from 2 to 5 g/sec, according to the type of injector used. It has been discovered that, if two or three pulsejets are mounted close together, the output of each unit is decreased by ten per cent for the same specific fuel consumption.

For starting, the spark is provided by a battery- or magneto-operated igniter plug. An injection of compressed air must be made at a pressure of 3 to 5 atm through a jet (4 to 10 mm in diameter) mounted in the entrance of the detector tube and directed towards the combustion chamber. These "squirts" of air must be frequent, but of short duration. Fuel injections are made at the same time as the air so as to avoid the possibility of a residue of liquid fuel accumulating in the combustion chamber. Should ignition not take place, the fuel must be cut off immediately and pure air injected to blow out surplus fluid. Electric contact is switched off as soon as the pulsejet begins to function.

A number of safety precautions have to be observed when these units are fitted to an aircraft. For example, they must be located as far as possible away from any inflammable material, while wing-surfaces near to the body of a pulsejet should be covered with a sheet of polished aluminium to reflect the very considerable heat generated by the combustion chambers.

A typical installation for four Type 3340 Escopettes (as fitted in an Emouchet sailplane) is shown in Fig. 5. All the requisite fuel- and air-pressure cocks (for starting), together with the two main throttles (controlling fuel pressure and air pressure feed to fuel tank), are located in the cockpit, but outside assistance is required when ground-starting to direct the jets from a compressed-air bottle into the intake of the pulsejets. For starting, the air pressure to the fuel tank must be regulated to 1.5 atm and fuel pressure to 0.75 atm by the two throttle controls referred to above. Maximum duration at ground level is 10 min at full throttle, i.e. a fuel pressure of 1 atm.

In flight, starting or restarting is easily accomplished at a speed of approximately 75 km/hr; all the pilot needs to do, having set his throttle at the starting position, is to switch on the ignition and open the fuel cocks.

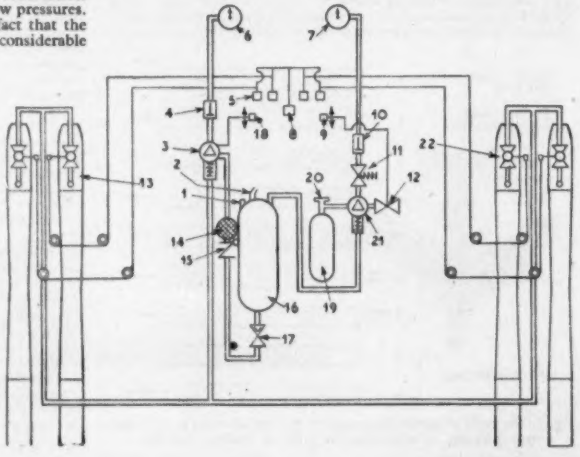


Fig. 5. Fuel circuit of a typical four-unit installation, showing the positions of controls and valves.

1. Fuel-tank filler cap.
2. Excess-pressure vent.
3. Throttle valve.
4. Relay to fuel pressure gauge.
5. Individual taps for fuel regulator valves.
6. Fuel pressure gauge.
7. Air pressure gauge.
8. Master fuel-feed cock.
9. Air control throttle.
10. Relay to air-pressure gauge.
11. Safety valve (air, 4 atm).
12. Emergency pressure release.
13. Fuel regulator valve.
14. Fuel filter.
15. Non-return valve.
16. Fuel tank (20 litres).
17. Main fuel cut-off.
18. Fuel-control throttle.
19. Compressed air bottle (1 litre at 20 atm).
20. Main air cock.
21. Air regulator valve.
22. Fuel injector.

A CALL TO ARMS

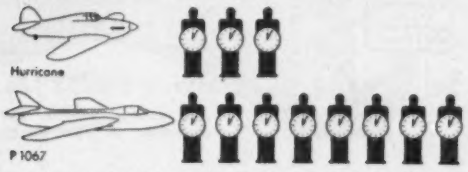
Hawker Siddeley Chairman on the "Very Serious Problems" of Defence Production

ADDRESSING shareholders at the sixteenth annual general meeting of the Hawker Siddeley Group on January 16th, the chairman, Mr. T. O. M. Sopwith, C.B.E., Hon. F.R.Ae.S., delivered a speech that is worthy of more detailed treatment than we are normally able to accord to company reports.

"A year ago," said Mr. Sopwith, "we asked if the air power of the R.A.F., the Commonwealth and our Allies was strong enough to preserve the security and freedom of our people. The answer then was NO. It is still NO.

"Although our research and experimental prototypes have led the world for years, the R.A.F. is still flying with aeroplanes which are obsolescent.

"In the haste of disarmament and retrenchment, orders for the more modern aircraft were not placed in time to ensure that we could outclass a potential enemy. We had the types; but we did not have production orders for them. Now we have some of the orders required, but it is indeed late in the day."



Man-hours in building: a comparison between Hawker fighters.

Mr. Sopwith went on to say that of the things which governed the production of aircraft and engines, the first was design and development; the second was manpower; the third was raw materials; and the fourth was machine tools. But even when these four vital points were under control, there was still the all-important factor of time: the time that it took to build aircraft—time that must be measured not in days or even months, but in years.

What, asked Mr. Sopwith, was the position to-day as compared with the war years? A modern fighter like the Hawker P.1067 absorbed nearly three times as much manpower as did its counterpart, the Hurricane, in 1940. Manpower was the key to almost all our problems and we *must* beat the manpower shortage. It was an anomaly that apprentices were conscripted for military service when they had completed their training and were beginning to be of real value.

Deliveries of materials such as steel, light alloys, copper, brass and bronze now took from three to eight times as long to obtain. The material shortage must be overcome by eliminating bottlenecks and stringently applying priorities.

"Machine tools, also," continued Mr. Sopwith, "are a harassing problem. We have placed substantial orders for them in this country, in America and on the Continent. But . . . deliveries are, in the main, running late. And we *must* get those vital tools.

"In three of our major works we are curtailing our civil and commercial activities to a considerable extent in order to make manpower, space and plant available for rearmament. There is a risk that we may lose ground in these commercial fields but we feel that this step is necessary in the national interest."

Reviewing the group's activities in detail, Mr. Sopwith recalled that Hawker Aircraft had increased their plant by 1¼ million square feet by taking over the Squires Gate factory in which suitable equipment was now being installed. The P.1067 was being prepared for large-scale production, while the Sea Hawk was already in production at Kingston, the first deliveries to the Royal Navy being due this month. The year under review also saw further Sea Fury deliveries to the Royal Navy, Canada and Australia.

A great deal of the group's work was upon delta-winged aircraft, the 707 series having sent Avros to the forefront of all aviation companies in this respect, while the G.A.5 was an example of close collaboration by companies within the group—Gloster, Avro and Armstrong Siddeley.

Turning to well-established fighters, the Meteor, in various marks, was still in quantity production for the R.A.F. and for the air forces of various N.A.T.O. and Western Union countries, while the Armstrong Whitworth N.F.11 development, spoken of as "the deadliest night fighter in operation today," was already in R.A.F. service and had performed well in recent exercises; it was in production at Coventry for N.A.T.O. countries, and would form the backbone of Western European night-fighter defence.

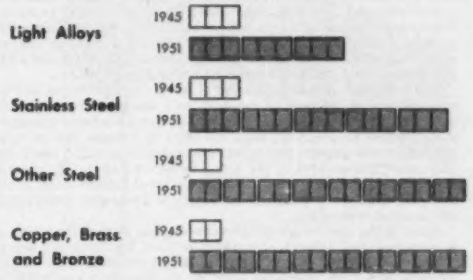
Going on to review production of other types of aircraft, Mr. Sopwith reported the R.A.F.'s satisfaction with the very-long-range Shackleton, and the good work being done for the M.o.S. by the high-flying Ashton. He then paid tribute to the Anson (its sixteen years in production are now drawing to a close) and spoke of Avro's new production-line at Malton, Ontario, whence the Canadian company had recently made the first deliveries of the CF-100 to the R.C.A.F.

Reduced priority would have to be accorded to the group's civil aircraft, the Apollo and the Canadian Jetliner.

Turning to the group's engine work, Mr. Sopwith recalled that, as reported last year, Armstrong Siddeley had granted a licence to the Curtiss Wright Company to manufacture the Sapphire in America. A.S. had received substantial direct orders for both their Sapphire and Double Mamba engines, and were now actively engaged in preparing their existing premises at Coventry and co-operating with the group's new Brockworth Company at Hucclecote for this very large volume of production. Apart from the new production aircraft in which these Sapphire and Double Mamba engines are to be fitted there were new prototype aircraft in which the Sapphire was being, or would be, installed.

During the year the existence of the new Armstrong Siddeley Snarler rocket motor—first British product of its kind—had been revealed, while still another new engine taken off the secret list was the Viper, which powered the Australian pilotless aircraft.

The Avro Canada Orenda was also in production and very substantial orders had been received from the Canadian Government. It would be remembered that last year the Orenda was about to take the air in the CF.100; it had since flown hundreds of hours in several of these aircraft.



Material-delivery delays: each rectangle represents two months.

Briefly mentioning the secret work being done by the group in the field of rockets, guided weapons and missiles, the chairman then went on to report good progress in other sections of the organization. He paid tribute to the intensive research carried out by High Duty Alloys, who had consequently secured large contracts for gas-turbine compressor blades, and referred also to Air Service Training, Ltd., who would come of age this year. A.S.T.'s aircraft division had been expanded, and now undertook both production of major aircraft components and experimental jet installation work.

Earlier in his statement, the chairman had reported a satisfactory year for the group with an increased turnover, both in quantity and value, and an increased profit, compared with the year 1949-50. The existing taxation code, however, made inadequate allowances for depreciation and replacement of capital assets—or for expansion, or even replacement, of trading stocks. The board had, therfore, considerably increased its reserves, part of such increase being due to sales of rights to manufacturers abroad.

Mr. Sopwith concluded his address with the words: "The commanding lead which this country has in the new jet age is due in no small measure to the talent and hard work of the people who have produced such exceptional aircraft and engines as the Hawker P.1067, the A.V. Roe Deltas, the Gloster G.A.5 and the Armstrong Siddeley Sapphire. These are outstanding achievements, but we must now translate them into thousands of aircraft available on the runways and air-strips of the Western world.

"Therein lies our future strength and, I regret to say, our present weakness."

AROUND ADEN AIRWAYS

Pleasant Experiences as a Passenger on a B.O.A.C.-owned but Independently Operated Line

By GEOFFREY DORMAN, A.R.Ae.S.

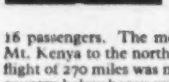
LAST summer I was afforded an opportunity of making a short tour of some of the routes of Aden Airways, starting at Nairobi and ending at Cairo; I flew via Mombasa in Kenya, Mogadishu in Italian Somaliland, Aden, Kamaran Island in the Red Sea, Asmara in Eritrea, Port Sudan in Sudan, Jedda on the Arabian coast (the port for Mecca), and then across the Red Sea—for the third time in one day—to Cairo.

Aden Airways are a wholly-owned subsidiary of B.O.A.C., but work as an entirely separate company, only their policy being guided by the parent Corporation. The Aden Airways system was at one time No. 5 Line, B.O.A.C., which was formed into a separate organization, for political reasons, in 1948. At present it operates Dakotas, but traffic is increasing so rapidly that some bigger aircraft will be necessary soon, and I was given to understand that the chartering of Argonauts from B.O.A.C. was under consideration. These 40-seaters would be particularly useful during the period from August to October, when pilgrims from all over the Moslem world visit the Holy City of Mecca. Mecca is a prohibited area for all aircraft and only Moslems may go there. Pilgrims go by sea or air to the port of Jedda, which is 40 miles by road from Mecca. When I passed through Jedda the pilgrim season was due to begin in a fortnight, and already there was a big concentration of airliners of many lines and many makes.

Aden Airways' general manager is A. de Graaff Hunter, but he was on leave at the time of my visit, so I was unable to make his acquaintance; nor was I able to meet the deputy general manager, P. B. Putt, as he could not leave his office in Asmara, two or three miles from the airport, during our 95-minute stop, and I could not leave the Customs area to see him. However, on the flight from Asmara to Cairo, we had as passengers Steve Colvin (chief pilot) and J. S. Chambers (publicity manager), so I was able to get much information from them.

Aden is the real centre of the network, but as the climate there is very hot and humid, the administrative headquarters are in Asmara in Eritrea, which is under British mandate from UNO. Asmara is 7,500ft above sea level, so the climate is preferable to that of Aden. The various links are shown on the accompanying map.

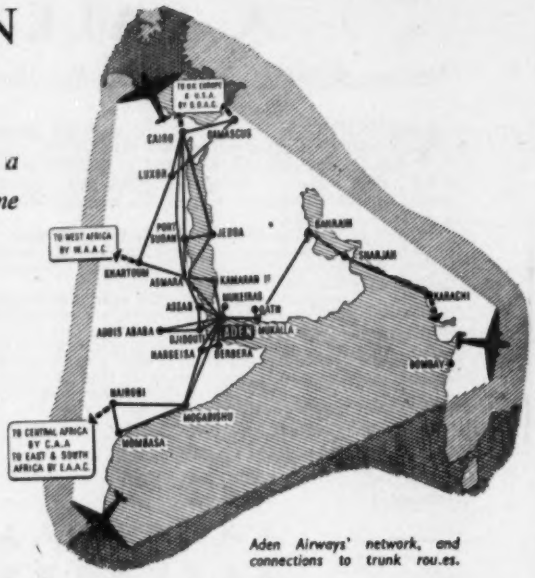
On joining the system at Nairobi, I was taken charge of by John Dudley, the company's representative there, who drove me to Eastleigh Airport. We took off for Mombasa at 7 a.m., flying in Dakota VR-AAE with Capt. Johnny Pascoe, a crew of three, and



Appropriately, the company's insignia features the B.O.A.C. Speedbird, but with an extra wing added.

16 passengers. The morning was fine—though too misty to see Mt. Kenya to the north or Mt. Kilimaniaro to the south—and the flight of 270 miles was made in 1 hr 45 min, flying at 9,000ft. The country below began with the flat grass plain around Nairobi, then became dry, arid and mountainous where the ground falls away to the coast, and, finally, green and fertile near the coast. We followed a course not far from the railway and road from Nairobi to the port of Mombasa, passing over some small towns and settlements, at least one of which had its air strip.

After 45 minutes on the ground at Mombasa, we took off for Mogadishu in Italian Somaliland, 540 miles. We had a fine view of Mombasa, which is on an island in a creek, with many docks, and a railway bridge to the mainland; and then northward over dense green palms, and in sight of great surf breakers rolling in from the Indian Ocean. After 1 hr 45 min we were over the border between Kenya and Italian Somaliland, and in a further 20 min we crossed the Equator with no fuss nor ceremony, for crossing the line means nothing to these "locals." Stewardess



Aden Airways' network, and connections to trunk routes.

Diana Dowell served us with hot coffee and very appetising sandwiches, well worthy of the catering department of B.O.A.C., and after 3 hr 35 min we landed at Mogadishu.

We approached over a coast from which the spray from breakers was rising as from a small edition of Victoria Falls. The town shows signs of wartime bombing, but there is a good airport with one good long runway, and a terminal building which was crowded with Italians, Somalis, Arabs, Indians, and other races. All were milling around together, for Customs segregation was very lax.

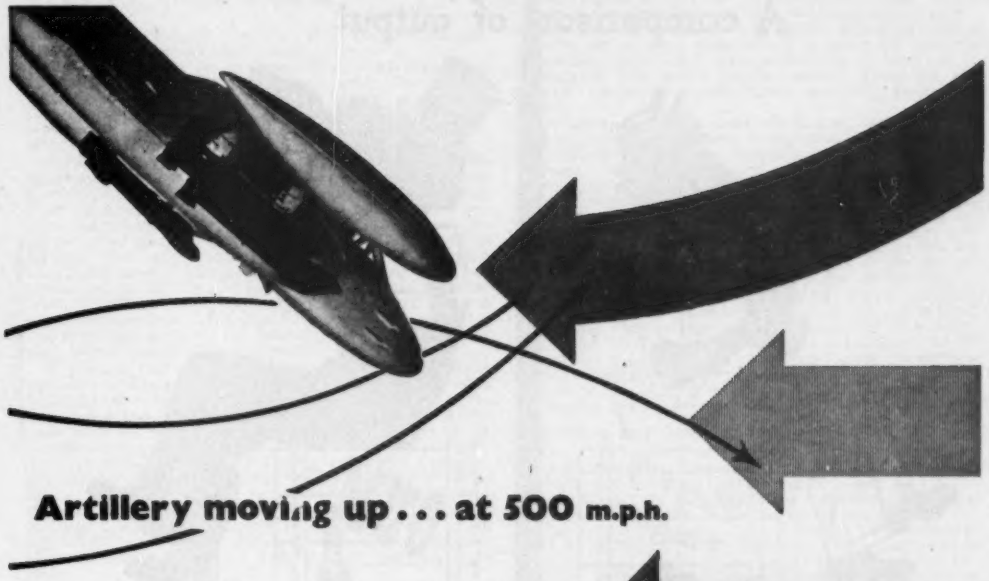
We took off with 19 passengers—only six of whom were Europeans—and the rest of the load was made up of luggage and freight, including food for Aden, such as sausages, bacon, and butter, all difficult to obtain there. The Aden Dakotas have a C. of A. for 28,000 lb, and we were still well under maximum load. But in the great heat prevailing, it seemed to me that we took off a bit sluggishly. The skipper, however, told me that this was not really so; he purposely held down for a bit to gather speed.

Mogadishu to Aden is 750 miles. Soon after we were airborne, we were given a most excellent lunch of cold chicken and salad, pineapple and cream, cheese and coffee, with sherry and red wine. Owing to the mixture of races, some Asian and African passengers had to have special food which made the stewardess's work a bit complicated, so Capt. Pascoe handed over the controls to the first officer, and came back into the cabin to act as wine steward and so get lunch served more quickly. This, and many other actions of the Aden Airways crews, seemed to contain very much of the old informal spirit of Imperial Airways.

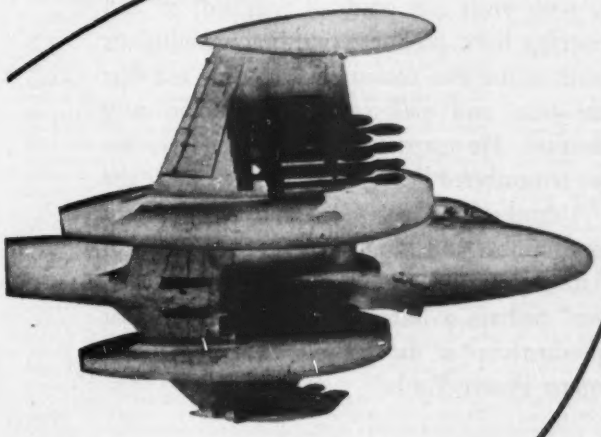
We flew over a part of Abyssinia, but it was mostly covered with cloud; what I did see through gaps seemed mountainous, arid, and uninviting. We were about 35 min behind schedule owing to a very strong head-wind for much of the way; as we crossed the Gulf of Aden from Berbera to Aden, it was blowing a gale from the north. Aden is a rock of volcanic origin which is believed to have been thrown up by the same cataclysm which formed the Great Rift Valley, the Central African lakes, Red Sea, and Dead Sea. As we approached it from the south it reminded me of both Hong Kong and the Rock of Gibraltar. Approaching at 4,000ft, we kept hearing thuds against the side of the fuselage: these, the skipper told me, were collisions with locusts, one of which flattened itself against the windscreen. They were being blown out to sea, quite out of control, by the gale.

We landed on Aden Airport 4¼ hr later, just as the sun had set, and got through Customs quickly. The airport is in the Aden Protectorate, which lies on the mainland and is reached by an isthmus from the colony that is the Aden Rock. It has been for many years an R.A.F. station, and now a new terminal building is nearing completion.

I was quartered at the Crescent Hotel in Aden proper, and after I had bathed and changed, Johnny Pascoe drove me to Aden Airways mess on the airport for drinks and dinner. As we drove across the isthmus I saw by his headlights a number of crabs, both



Artillery moving up . . . at 500 m.p.h.



The Meteor in its Ground Support role can attack any target with the fire-power equivalent to 25 field guns or 4 cruisers. Within 30 minutes the same aircraft can be back over the same target with 4,000 lbs. of bombs.

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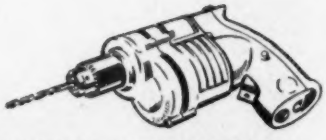
A comparison of 'output'

Many months of investigation, with visits (all paid all weighed) to and from the United States of Ameriky have produced startling conclusions on comparative output per worker in the two countries. It turns out that the British Worker, *per se, ipso facto,* and *nulli secundus,* is in no way inferior to his American counterpart. He marries less frequently, sees the sea more often ("But it must be remembered" says the Report* "that the United Kingdom is an island") drinks less Coca Cola and uses different cuss words. But he has the same number and kind of hands and his brain ticks in similar fashion to the American Thinking Box. "We have reached the conclusion," says the Report* perhaps a little obviously "that all that is necessary to raise British productivity is the provision of more and more and more and more Desoutter Power Tools."

* *This report was specially written by a Committee of Desoutter's Little Horses with the Managing Director as its amiable Chairman. The report was unanimous.*



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AROUND ADEN AIRWAYS . . .

dead and alive, which had crawled out of the sea, on to the road; some had been flattened out by traffic.

During the night I was awakened by a sudden gale; but it subsided after about twenty minutes, considerably cooling the hot, humid atmosphere. I am told this is a frequent phenomenon, caused by cooling of the ground or rock. There is a similar nightly performance at Kano on the southern fringe of the Sahara in Northern Nigeria.

The next morning, at 5.45 a.m., Dave Payton, the Aden Airways representative, called for me just as it was getting light and drove me round the rock to see what I could in the short time available. I saw the famous ancient water-tanks which once collected and stored the rain and condensation from the clouds that form over the rock; they are in the little town of Crater, on the east tip of the rock. This town is built in the crater of the volcano from which Aden arose. I also saw the deep road-cutting which was blasted through the rock a hundred years ago by the men of the South Wales Borderers as penance for a mutiny, and a shipyard in which dhows are built. Legend has it that it was in this same yard that Noah built the Ark, and local shipbuilding art does not seem to have changed there very much!

At 7.30 a.m. local time we took off in the same Dak with the same crew for Kamaran Island, 240 miles. We at once climbed to 10,500 ft to cross the Yemen Mountains and reached the Red Sea coast over a very white town named Hobeida, which has a long white sandy spit running north. Here we passed out over the sea to make our let-down on Kamaran Island, a British protectorate. This is, in fact, a real desert island with a few palms, a small port, and a number of huts—a quarantine station for pilgrims bound for Mecca. The Commissioner is a well-known and colourful character, Maj. David Thomson, who is, in effect, the king of Kamaran Island, with extremely courtly manners. He drove me, and four other passengers and our stewardess, to his house, where he gave us all delicious iced lime juice made from fresh limes.

In front of the airport building Maj. Thomson has placed a notice-board on both sides of which are painted statistics relating to the island. He has three cars—the only ones permitted on the island—and has made good roads, 30 yards wide. When I asked him why he needed such wide highways, he said, "In case I meet the other fellow!" The runway is hard sand, 2,000 yards long and 200 yards wide, and was used as an emergency landing strip on many occasions during the war.

Hottest Place in the World

After an hour on the ground, where the heat was great, we took off on the next leg across the Red Sea to Asmara, 242 miles, which took 1¼ hr. We reached the Eritrean coast at the southern end of the Gulf of Zula; just inland is a place, several hundred feet below sea level, reputed to be the hottest in the world. At the northern end of the gulf is Massawa, the port for Asmara, the capital. As we approached Asmara, which is on a tableland 7,500 ft above sea level, the road and railway from the port climbs up the mountains in numerous incredible hairpin bends; a train or car journey would certainly have its thrills. Near Asmara there is a monastery in which no female is allowed, human, bird, or animal—not even hens!

The land for miles around Asmara is quite flat, and a strong wind made our landing (on a good two-runway airport) at this height above sea level seem quite normal. The wind was quite cold, and having left the heat of Aden dressed only in a very thin Chinese coolie-suit which I bought in Hong Kong, and which is ideal for tropical climates, I found the wind distinctly chilly.

Here I said good-bye with considerable regret to Johnny Pascoe and his crew who had brought me all the way from Nairobi. Johnny introduced me to the new crew (under Capt. Leslie Ward) and I went on in the same Dakota, VR-AAE. We flew from Asmara by the shortest practicable route to the Red Sea, as it was a bit bumpy over the mountains, and cold lunch was served on the leg of 316 miles to Port Sudan, which we flew in 2 hr 10 min. Before we reached Port Sudan we passed Suakin, which was the old port for Khartoum. Port Sudan is built on a natural basin into which quite large ships can go right to the docks, where there is a big marshalling-yard, the railhead for Khartoum. In the town are some big, quite imposing modern buildings, which I was told are government offices, and there is a native town, quite separate, but adjoining the northern outskirts.

We set course back east across the Red Sea for Jedda, 185 miles, which we reached in 1 hr 15 min. Jedda is a fair-sized town standing by itself on the coast with nothing but desert to be seen within the limits of the good visibility then prevailing. There are plain signs of some buildings which have been submerged by the sea, with some big modern buildings near the seaport. The airport is slightly inland to the north. There is a fairly new and large terminal building in which we waited while the Dakota was refuelled. We had off-loaded a few passengers, early pilgrims for Mecca, and took on a few more Arabs for Cairo. Jedda was hot, but not so hot as Port Sudan; at both places it was a dry heat, and at Jedda there was a cool breeze. On Jedda's airport, the runways of which are on hard sand, difficult to distinguish from the surrounding desert, there were airliners of all kinds up to Constellation size, with a preponderance of Skymasters and Dakotas. The airport can take Stratocruisers, which are frequent visitors.

Our captain tried to make the stop here as short as possible, as two of our passengers, Aden Airways chief pilot Steve Colvin, and publicity man J. S. Chambers, hoped to catch the B.O.A.C. Argonaut to Bahrein at Cairo. But we were delayed by the interminable immigration and emigration formalities which are more lengthy throughout the Middle East than in any other part of the five continents which I have yet visited. We managed to get airborne in the 770-mile trip to Cairo after 75 min, at 4.50 p.m. Cairo time, and set course for the third crossing of the Red Sea that day. I had always thought of the Red Sea as comparatively small, judging from its look on an atlas, but by the time we reached the north end I realized what a very big sea it really is. We had a very good dinner as we crossed the sea, and at about 8 p.m. Capt. Ward brought me a slip of paper with the complete Test Match score which the radio officer had just received. It seemed odd to get such news when flying through the darkness across the Red Sea from the port of Mecca to Egypt! Our first sight of the coast of Egypt was a great flame where a bore-hole is continuously burning as a safety-valve for the oilfield there.

Inoculation and Complication

Before I left Nairobi I was told that the Egyptians had suddenly imposed a demand for cholera inoculation certificates from anyone passing through Aden, as it had been rumoured there was a cholera outbreak there. Mine was not current, as I was told before leaving London that cholera inoculation was not necessary if I had not been to, or east of, Karachi. So I expected a bit of trouble in Cairo, the more so as I had no transit visa; the Egyptian Consulate in London would not give me one before I left, as I was going first to Africa, south of Egypt. There is no Egyptian Consulate in Salisbury or Nairobi, and I was told the only place where I could get the visa in East, Central or South Africa was Cape Town; and I could not go there for it. But East African Airways had sent a signal to B.O.A.C. in Cairo to tell them of my predicament, and to ask them to do what they could to ease my passage. Knowing from long experience how competent B.O.A.C. officials are in helping their passengers out of difficulties, I was not really worried, and I thought that the worst that could happen would be that I would be kept in quarantine in Cairo for the night before going on the next day by Iraqi Airways to Damascus. Being one of those people who always cross their bridges before they come to them, I began to feel how nice it would be when I was settled comfortably in bed that night—either in the Metropolitan Hotel in Cairo where I had a room booked, or even in quarantine, wherever that was.

We saw the myriads of lights in the towns bordering the Nile south of Cairo sooner than we expected, and we landed at Farouk Airport at 9.30 p.m. Cairo time, 5½ hr after leaving Jedda. As I walked down the steps from the Dakota into the pleasant, dry, soft warmth of an Egyptian July night, I was both delighted and relieved to see Brian Ogley, a sales representative of B.O.A.C., in Cairo. He escorted me to the airport building and told me he thought that everything would be all right. At once I saw a smiling Egyptian immigration officer from whom I had very friendly and courteous handling on the last three times I had passed through Farouk Airport in the last year. He recognised me—probably by my Hong Kong coolie-suit which I have often worn in Cairo before—and greeted me as an old friend. He quickly wafted me through everything and never asked specifically for a cholera certificate, and in a very short time Brian Ogley was driving me to Cairo and the Metropolitan Hotel.

My tour of Aden Airways ended in Cairo, and the day after I arrived there I was taken over by Iraqi Airways for a tour of their network (see *Flight*, November 9th, 1951). But before handing me over to Iraqi, Brian Ogley, representing both B.O.A.C. and Aden Airways, took me for a lightning tour of parts of Cairo I had not previously visited; these included the Citadel in the south-east corner, from which there is a fine view of the city, and the famous Mosque of Mahomet Ali, and the Blue Mosque. To enter these mosques the faithful remove their shoes, but there is a modern concession to non-Moslems which permits them to pull on over-shoes rather like frogmen's flippers, so that the foot-covering in contact with the holy ground has had no contact with unhallowed soil outside.

I have often thought that the most dangerous part of any air trip is the car or coach ride between airport and city centre; this used to be especially true of Cairo, where drivers used mainly hooter and accelerator, and where cars, lorries, camels, donkeys and pedestrians vied with one another on the all-against-all principle. I was glad to note a great improvement, brought about by banning hooters and an insistence on some sort of orderly progression.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Business Firms' Flying Clubs

IN his letter of January 11th, Mr. W. B. Holroyd has hit the nail squarely on the head regarding age, money, and inclination to fly.

It should be pointed out that, once armed with a Private Pilot's Licence, a young man may be able to join the R.A.F.V.R. and subsequently get forty hours' flying a year for which *he* is paid. Unfortunately, the attitude of employers to the technician reservist is often hostile, since, in an emergency, when his services are most badly needed, he is recalled to active duty. This undoubtedly affects his prospects of advancement.

Conflicting loyalties of this nature are a matter for the private conscience; but what better incentive for doing a first-class job could the young designer have than to know that he is helping to fashion an aircraft which might be his own weapon should another conflict arise? On the other hand, what chagrin for him to leave his transonic, air-conditioned protégé at week-ends and freeze in a Tiger Moth!

London, S.E.22. D. J. POWELL.

What Is A Delta?

IT would appear that the description "delta" is now accepted as applying solely to aircraft of purely triangular plan-form, whereas Professor Lippisch, who introduced the term, used it to denote any tailless aircraft. For instance, the Me163A, which is far removed from the Avro 707 formula, having a quite gently swept wing of conventional plan-form, was originally designated Delta IF; moreover, many of Lippisch's earlier "delta" series were more akin to the A.W.52 in concept than to the currently accepted delta formula.

Luton, Beds. A. KNIGHT.

The Ultra-light

PERMIT me to say that, whilst appreciating the spirit in which Mr. Wheatley's plea ("The Case for the Ultra-light," December 28th) for everyman's aircraft is written, and whilst agreeing with his suggestions, I cannot help wondering if he has ever heard of the aims and achievements of the Ultra Light Aircraft Association.

Since its inception in 1946 the U.L.A.A. has studied the problems of popular flying on inexpensive and safe little aircraft which are simple to handle, and which can be operated off any meadow or grassland. It is making every effort to promote a flying movement based on such aircraft. Types which come close to this ideal are already in existence, and may be constructed by amateurs under guidance by, and with aid from, the Association.

Through the efforts of the U.L.A.A. concessions have already been obtained from the authorities and the helpful spirit we have found has made it possible to render good services in individual cases to members and affiliated clubs and groups.

The Association operates its own inspection organization and design team, both approved, for the certification of aircraft. Aid is given to constructors and owners in respect to materials, accessories and components, including engines and airscrews. Training, operation and insurance problems are handled, and rallies organized. In short, by concerted efforts, and aided by authorities and organizations such as the Royal Aero Club and the Kemsley Flying Trust, the Association does everything possible to promote a flying movement for all those who cannot afford to operate expensive aircraft or to pay for flying on aircraft restricted to operations from airfields only.

Londonderry House, London, W.1. A. R. WEYL.
Member of Executive Committee, Ultra Light Aircraft Association.

ONE feels that Mr. Wheatley is being over-optimistic in his article which, I think, represents the general opinion at the end of the war; many people now take a more sober view of the subject after analysing the facts.

It is unlikely that for the "man-in-the-street" the gap between the local meadow and Heathrow will ever be filled by the Chilton or any other ultra-light. This is primarily because an ultra-light is more expensive to maintain than a car and can never, in this country, provide an alternative form of transport. As far as petrol and oil alone are concerned, it may be able to compete with a car, but on an overall cost basis taken over, say, 15 years, it would be far more expensive.

This is not to say that the ultra-light has not got its uses—I feel that it could play a very useful part in providing solo training hours for both civil and military pilots.

As far as a specification is concerned, surely all that is required is to know that an ultra-light must carry either one or two people and 5-10 gallons of petrol. It should be cheap, simple, robust and small; easily maintained and stored and both economical and safe in operation.

I agree that the position as regards obtaining engines is unattractive, but suitable engine designs (such as the Coventry Victor Neptune and the Zundapp) do exist; all that is required is the assurance of a market to make it worth while putting them into production.

Finally, I would like to add that the Ultra Light Aircraft Association is doing all that is within its power to encourage the movement in this country.

Bristol. R. J. MARGETTS.

Associate-Agreement Pioneers

SOME further points in connection with this Company, which was referred to in the article, "The Independent Air Operator" (*Flight*, January 4th) may be of interest.

To begin with, we had the honour of being the first to re-start charter operations after the war. This was with an Auster flight between Cardiff and Bristol (Filton) on January 1st, 1946, the day on which the ban on civil flying was lifted.

We also had the distinction of being the first company—jointly with Western Airways, Ltd.—to be granted an Associate Agreement. In fact, we claim, and it possibly should go on the record, that it was largely through our efforts that Associate Agreements were started. The circumstances were that B.E.A. recommenced in 1947 the Cardiff-Weston route, which in pre-war days had been very popular, but they lost financially and at the end of the summer announced they would be discontinuing it. This led to a good deal of local dissatisfaction and a strong demand that if B.E.A. would not fly this service independent operators should be allowed to do so; and the service was, as stated above, subsequently operated by Cambrian Air Services and Western Airways in 1948. Western Airways dropped out and since then it has been—and still is—flown by ourselves.

W. W. STANLEY.
Cardiff Airport. Director, Cambrian Air Services, Ltd.

A 1910 Collision

IN his article "48 Years Back" in *Flight* of January 4th, Geoffrey Dorman states that the first fatal air collision occurred during the Milan flying meeting of 1910. It is true that a collision occurred between a Farman biplane flown by Bertram Dixon and an Antoinette monoplane flown by Thomas, but the results were not fatal to either pilot.

Capt. Dixon was seriously injured, and suffered from the effects of the accident for the remaining years of his life. It is interesting to recall that this pilot took C. G. Grey for his baptism of the air, this being on the occasion of the Lanark meeting earlier in the same year. In those days, it was said that any landing from which you walked away was a good one. The qualification held good in this instance, for Dixon and the inimitable C.G.G. walked away from a wrecked Farman Box-kite.

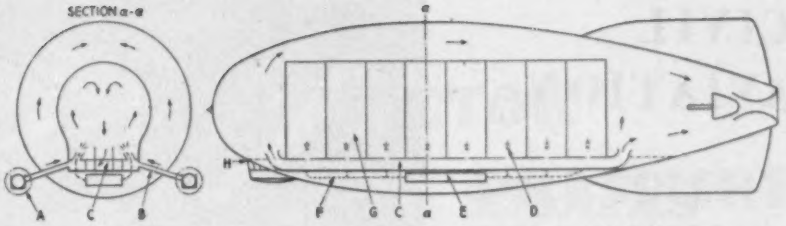
Ryde, I.o.W. FRANCIS A. KAPPEY.

[Geoffrey Dorman comments: "Dixon . . . never fully recovered, and died as a result almost exactly three years later: so it is true to say that the crash killed him. I was wrong in saying that Thomas also lost his life, though I do not remember hearing of his ever flying again."—ED.]

Another Hot-airship

THE article by Capt. Arthur in *Flight* of November 2nd on the possibility of a "modern Montgolfier" aroused my personal interest and I found it interesting enough to re-write in brief for our own aviation Press. My article in *Vliegwereld* brought me into contact with a young Dutch technician who has a concept so different that your readers may be interested.

The inventor, Mr. J. Favejee, has aimed at an airship capable of carrying 100 or more passengers over long distances (e.g., the Atlantic crossing). The airship contains an air-pocket of 400,000m³ (14,200,000 cu ft) divided into eight equal sections, the material used being a lightweight, heat-resisting fabric (perhaps an asbestos and cotton tissue would answer the purpose). The air-pockets are heated by 16 oil-burners, drawing combustion air from ram intakes in the nose of the ship. The main propulsion is provided by four 2,500 h.p. turboprops exhausting into the air-pockets and so providing additional heat: possibly this alone would be sufficient and the burners could be dispensed with. The hot air circulates around these pockets and finally leaves the ship at the rear, where it provides a measure of jet propulsion.



Principal features of the "modern Montgolfier" outlined in the letter from Mr. B. van der Klaauw.

A = Turboprop (one of four).
B = Duct conveying hot air to interior.
C = Central hot-air distribution duct.
D = Burners (16 in all).
E = Fuel tank for burners.
F = Fuel lines.
G = Air pocket (eight in all).

The inventor has calculated the dimensions of the air pocket to be 820ft by 147ft diam, and goes on to give the following weights :

	lb
Construction of ship	176,360
Passengers (100)	17,630
Crew (50)	8,800
Turboprop fuel	147,700
Burner fuel	66,000
Miscellaneous	24,250
Total weight	440,740lb

Dealing with the lift expected, the inventor calculates a gross lift of 529,100 lb when the air is heated to 288 deg, giving a pure lift, at sea level, of 88,000 lb. This would result in a ceiling of some 2000 m, or 6,500ft. The ideal ceiling, however, is 16,400ft, which demands an air-pocket temperature of 495 deg. The inventor has calculated a loss of heat at that altitude of 7,577.6 calories per second, and says 5,950 lb of diesel oil per hour will be necessary to compensate for this loss; the exhaust gases from the four turboprops are estimated to supply 5,752 calories per second and can thus compensate two-thirds of the loss. If a better kind of impregnated fabric were used for the envelope the loss might be much reduced.

The airship has two horizontal surfaces, situated at one-third and two-thirds of its length for stabilizing and control purposes. Their angles of attack may be altered independently, or together, for producing alterations in the ship's height or trim.

The inventor prefers turboprops, since at the calculated cruising speed of 250 m.p.h. the fuel consumption of a pure jet is about four times that of a turboprop. A maximum range of about 6,000 miles has been calculated, and an endurance of 26 hours might be possible.

Mr. Favejee believes a prototype of such a ship can be built, and he is anxious to hear comments from readers.

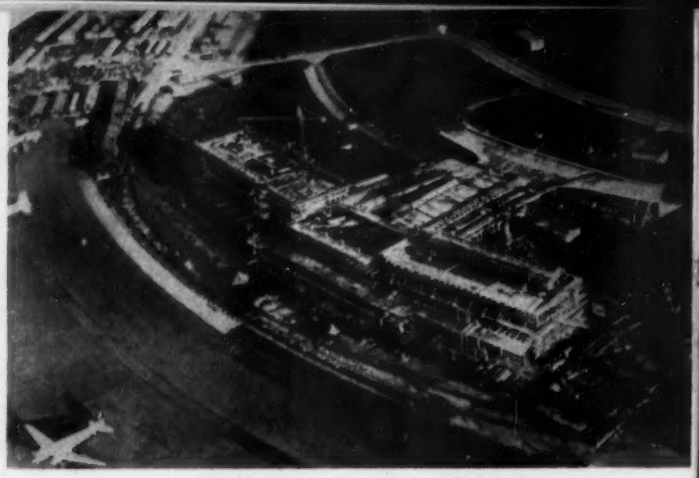
Wassenaar, Holland. B. VAN DER KLAAUW.

FORTHCOMING EVENTS

This week we give a full list of events so far notified. Also included are the Royal Aeronautical Society's branch fixtures for the current session, normally, it is impracticable to list these events, as there are now so many branches, all of which arrange numerous lectures and other functions. The extent of the list, and the calibre of many of the lecturers, bears witness to the healthy state of the Society's provincial offshoots.

Jan. 28–Feb. 1. Institute of the Aeronautical Sciences: 20th Annual Meeting, New York.
Jan. 28. R.Ae.C.: Courtenay Film Show.
Jan. 29. Society of Instrument Technology: "Mechanical Consideration in the Design of Servo Systems," by Prof. A. Tustin.
Jan. 30. R.Ae.S. Gloucester and Cheltenham Branch: "Turboprops," by E. Danvers.
Jan. 30. R.Ae.S. Weybridge Branch: Junior Prize Lecture.
Jan. 31. R.Ae.S. Section Lecture: "Problem of Short-haul Air Transport," by P. W. Brooks, B.Sc., A.C.G.I., A.F.R.Ae.S.
Jan. 31. R.Ae.S. Portsmouth Branch: "Airline Operating Problems," by Peter G. Masefield, M.A., F.R.Ae.S.
Jan. 31. R.Ae.S. Isle of Wight Branch: "Electronics," by P. Jackson.
Feb. 4. R.Ae.S. Derby Branch: "Airships," by Lord Ventry.
Feb. 5. R.Ae.C.: Courtenay Film Show.
Feb. 6. R.Ae.S. Chester Branch: Members' Lectures.
Feb. 7. R.Ae.S.: "Availability and Use of Aeronautical Information" (Joint Discussion with ASLIB).
Feb. 11. Institute of Transport: Brancker Memorial Lecture: "The Flying-boat and its Place in Aviation," by Air Chief Marshal Sir Frederick Bowhill, G.B.E., K.C.B., C.M.G., D.S.O.
Feb. 11. R.Ae.S. Bristol Branch: "Jet-engine Design," by A. A. Lombard, A.F.R.Ae.S.
Feb. 12. R.Ae.S. Section Lecture: "Flight-test Problems for Civil Aircraft," by B. P. Laight, B.Sc., A.F.R.Ae.S.
Feb. 12. R.Ae.C.: Film Show.
Feb. 13. Royal United Service Institution: "Long-range Jet Flying," by S/L. A. E. Callard, D.F.C.
Feb. 13. R.Ae.S. Manchester Branch: "Servicing Modern Aircraft," by G/C. G. M. Buxton, O.B.E.
Feb. 14. R.Ae.S. Graduates' and Students' Lecture: "Radar," by B. W. Hodlin, B.Sc.
Feb. 14. R.Ae.S. Isle of Wight Branch: "Welded Magnesium Components," by R. J. Cross.
Feb. 14. R.Ae.S. Portsmouth Branch: Films.
Feb. 15. Institute of Navigation: "Navigation Aids for Military Aircraft," by S/L. D. Bower.
Feb. 19. R.Ae.S. Section Lecture: "Glider Design," by K. G. Wilkinson, B.Sc., D.I.C., A.F.R.Ae.S.
Feb. 20. British Institution of Radio Engineers: "Search Radar for Civil Aircraft," by P. L. Strida.
Feb. 20. R.Ae.S. Southampton Branch: "An Introduction to Supersonics," by C. H. E. Warren, M.A.
Feb. 20. R.Ae.S. Weybridge Branch: "Flight Testing from the Pilot's Angle," by W/C. T. Balmforth, D.S.O., D.F.C.
Feb. 20. R.Ae.S. Coventry Branch: "Parachutes," by J. E. Hatfield.
Feb. 21. R.Ae.S.: "Power Steering for Aircraft by K. G. Hancock, B.Sc., A.F.R.Ae.S., and P. Parson, M.A., A.F.R.Ae.S. (at Brough).
Feb. 21. R.Ae.C.: Courtenay Film Show.
Feb. 21. Aerodrome Owners' Association: Annual General Meeting.
Feb. 21. R.Ae.S. Yeovil Branch: "The Giant Helicopter," by O. L. L. Fitzwilliams, B.A.
Feb. 22. Helicopter Association: "Helicopter Power Plants," by A. Graham Forsyth, B.Sc., F.R.Ae.S.
Feb. 23. Society of Licensed Aircraft Engineers: Main Lecture: "Some of the Responsibilities and Problems of an Airworthiness Authority," by R. E. Hardingham, O.B.E., F.R.Ae.S., M.S.L.A.E.
Feb. 26. R.Ae.C.: Courtenay Film Show.
Feb. 26. R.Ae.S. Graduates' and Students' Lecture: Gliding and Meteorology Symposium.
Feb. 26. R.Ae.S. Bristol Branch: "The Campaign in Malaya," by A.V-M. Sir Francis J. W. Mellersh, K.B.E., A.F.C., M.A.
Feb. 28. R.Ae.S. Isle of Wight Branch: "Radio and Radar Aids," by H. C. Hinckley.
Feb. 28. R.Ae.S. Portsmouth Branch: "Interplanetary Rocket Flight," by J. Humphries, A.F.R.Ae.S.
Feb. 28. R.Ae.S. Gloucester and Cheltenham Branch: "The Gas Turbine and its Influence on Petroleum Requirements," by K. C. Hunt, B.Sc., A.C.G.I., A.F.R.Ae.S., F.I.P., A.M.I.Mech.E.
Mar. 3. R.Ae.S. Derby Branch: "Trends in Airline Operation," by H. W. Seagrim.
Mar. 4. R.Ae.S. Chester Branch: "Synthetic Adhesives," by lecturer from Aero Research, Ltd.
Mar. 4. R.Ae.S. Section Lecture: "Bogie Undercarriages," by F. A. Cousins, B.Ae.E., A.F.R.Ae.S.
Mar. 6. R.Ae.S.: "A Study of Airport Noise," by J. D. Hayhurst, B.Sc.
Mar. 11. R.Ae.S. Graduates' and Students' Lecture: "An Introduction to Supersonics," by C. H. E. Warren, M.A., A.F.R.Ae.S.
Mar. 12. R.Ae.S.: Fifth Louis Blériot Lecture: "The Future of the Flying-boat," by H. Knowler, A.M.I.C.E., F.R.Ae.S. (in Paris).
Mar. 12. R.Ae.S. Weybridge Branch: "Planning and Aircraft Development," by F. Olaf Thornton, A.F.R.Ae.S.
Mar. 13. R.Ae.C.: Film Show.
Mar. 13. R.Ae.S. Portsmouth Branch: Films.
Mar. 13. R.Ae.S. Manchester Branch: "Design of Wheels," by J. Wright.
Mar. 13. R.Ae.S. Isle of Wight Branch: "The Princess," by H. Knowler, A.M.I.C.E., F.R.Ae.S.
Mar. 19. R.Ae.S. Brough Branch: "Airships," by Lord Ventry.
Mar. 19. R.Ae.S. Southampton Branch: "Development of the Viscount," by G. R. Edwards, M.B.E., B.Sc., F.R.Ae.S., A.M.I.Struct.E.
Mar. 20. R.Ae.S. Yeovil Branch: Technical Brains Trust.
Mar. 21. Helicopter Association: "Recent Helicopter Research Investigations," by W. Stewart, B.Sc.
Mar. 25. R.Ae.S. Graduates' and Students' Section: Annual General Meeting, and Talk on "Aerodynamic Oscillations of Suspension Bridges," by C. Scruton, B.Sc., A.F.R.Ae.S.
Mar. 26. R.Ae.C.: Annual General Meeting.
Mar. 26. R.Ae.S. Gloucester and Cheltenham Branch: "High-performance Jet Aircraft," by S/L. W. A. Waterton, A.F.C. and Bar.
Mar. 27. R.Ae.S. Section Lecture: "Civil Jet Aircraft Performance," by D. R. Newman, A.F.R.Ae.S.
Mar. 27. R.Ae.S. Isle of Wight Branch: Junior Prize Lectures.
Mar. 27. R.Ae.S. Portsmouth Branch: Annual General Meeting.
Apr. 2. R.Ae.S. Weybridge Branch: "Why a Delta?" by S. D. Davies, B.Sc., F.R.Ae.S.
Apr. 2. R.Ae.S. Chester Branch: "Flight Refuelling," by C. H. Latimer-Needham, M.Sc., F.R.Ae.S., F.Z.S., H.S.A.E.
Apr. 4. R.Ae.S. Yeovil Branch: Annual General Meeting.
Apr. 7. R.Ae.S. Derby Branch: "Flying-boats," by H. Knowler, F.R.Ae.S.
Apr. 16. R.Ae.S. Weybridge Branch: Film Show.
Apr. 22. R.Ae.S. Graduates' and Students' Section: "Servo-mechanisms," by P. H. Borlace, B.Sc. (Eng.), Grad. R.Ae.S.
Apr. 22. R.Ae.S. Bristol Branch: A.G.M. and Film Show.
Apr. 23. R.Ae.S. Brough Branch: "Testing of Experimental Aircraft," by Lt. R. H. Reynolds, D.S.C., A.F.C., R.N.
Apr. 23. R.Ae.S. Coventry Branch: A.G.M. and Films.
Apr. 24. R.Ae.S.: "Fuel Systems for Turbine-driven Aircraft," by J. E. Walker, A.F.R.Ae.S. (at Luton).
Apr. 24. R.Ae.S. Gloucester and Cheltenham Branch: A.G.M.
May 5. R.Ae.S. Derby Branch: "Wind Tunnels," by F. B. Greatrex, B.A., A.M.I.F.E., A.F.R.Ae.S.
May 14. R.Ae.S. Weybridge Branch: Annual General Meeting.
May 14. R.Ae.S. Chester Branch: Annual General Meeting.
May 29. R.Ae.S.: Fortieth Wilbur Wright Memorial Lecture: "Prophecy and Achievement in Aeronautics," by Sir Harry M. Garner, C.B., M.A., F.R.Ae.S.

CIVIL AVIATION



SWISS TERMINAL: Construction work on the imposing terminal building at Kloten Airport (Zurich) is now nearing its end. When completed the building will be one of the finest in Europe. Its right wing is devoted to administration offices and the airport restaurant takes up most of the left wing. The central section is to be used for passenger clearance and Customs.

B.E.A.'s CONTINENTAL FARES

WHEN a night excursion fare of £10 10s. is introduced on the London-Paris route next April, B.E.A. will, for the first time, be able to undercut the second-class rail fare to the Continent. The Corporation states that the new rate, which is 30s. lower than the present off-peak excursion fare, has been made possible by the introduction of a new three-level grading for day and night travel. The cheapest night rate will apply to journeys between 2300 hr and 0715 hr. Normal daytime return rates (£15 19s.) will apply between 0900 and 1900, while during the evening (1900 to 2300) and early morning (0715 to 0900) an intermediate excursion rate of £12 15s. will be charged.

As was the case last summer, passengers will also be able to travel by night to Nice and back for £25, provided that the trip is made between 2200 hr and 0600 hr on three specified days in the week. On all the other nights of the week the excursion fare will be £28 as compared with the normal daytime return fare of £38 14s. Thus the mid-week excursion on this route will save the traveller no less than £13 14s. While normal return tickets are valid for one year, the above excursions are limited to 23 days.

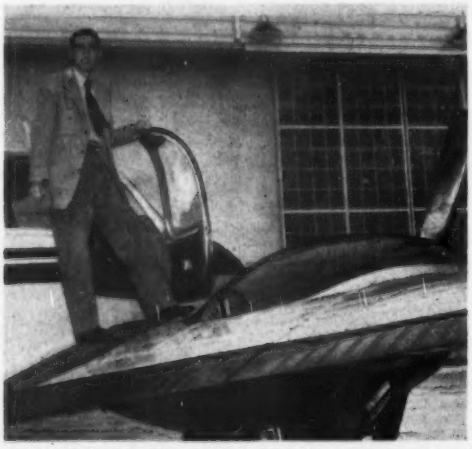
A.N.A. AND GOVERNMENT POLICY

THE sub-committee which was recently appointed by the Australian Government to investigate the general airline situation in that country is now reported to have offered a fair share of Government business to A.N.A. The estimated value of this State-sponsored traffic is said to be about £1,000,000 a year.

It is understood that the Australian Government is not willing to consider a merger of A.N.A. and the State-owned T.A.A. for the time being, but that it is prepared to offer A.N.A. a reasonable share of airmail contracts and permit civil servants to travel by this airline if they wish. (At the moment all civil servants travelling on duty must fly with T.A.A.) A.N.A.'s managing director, Capt. Ivan Holyman, is believed to have told the sub-committee that unless either financial assistance was forthcoming, or a merger with T.A.A. was authorized, he did not think A.N.A. could continue to operate for much longer. A large amount of capital would be required in order to expand the company's services and to purchase new aircraft to replace the existing fleet which is rapidly becoming obsolete.

In view of current Government activity on the loan market he thought that privately-owned airlines such as his own would have considerable difficulty in raising the money required to purchase new aircraft. It seems likely, however, that there will be further discussions between the sub-committee and representatives of A.N.A.

Meanwhile, Ansett Airways, who were not represented in the discussions, have issued a statement to the effect that if mail contracts are to be given to A.N.A. they also will expect a share. Their argument is based on the fact that Ansett's mail contracts were originally lost because the airline had to concentrate on war-work during hostilities.



FOREIGN DELIVERY: The first Beech Twin-Bonanza to be purchased by an operator outside the U.S. was recently collected from the manufacturers' base at Wichita and flown to Mexico City. The pilot is Capt. Carlos Borja, who will fly the machine for its new owners, the National Bank of Mexico. In this way the Bank's leading executives hope to speed up their visits to more than 150 outlying branch offices.

K.L.M. AIRCRAFT ORDERS

WITH the announcement of an order for a Douglas DC-6A Liftmaster, K.L.M. becomes the first carrier outside the United States to select this type of equipment for high-speed international cargo flights. The company intends to use it on North Atlantic runs, where it will carry payloads of up to 30,000lb and will augment its present cargo fleet of three C-54Bs. In purchasing the DC-6A, K.L.M. is maintaining what is thought to be the unique record of having ordered every type of commercial transport produced by the Douglas Aircraft Co. since the prototype DC-1.

The other companies which have ordered Liftmasters are Slick Airways, American Airlines, and the Flying Tiger Line. Military versions are also earmarked for the U.S. Navy and Air Force for general trooping and cargo-carrying duties.

In addition to announcing its DC-6A order, K.L.M. has also disclosed plans to modernize its West Indies fleet of DC-3s by substituting either Convair 240s or 340s. Because of its longer range and heavier payload, the Convair 340 would be a very economical aircraft for the Caribbean routes, but against this the company has also to consider the claim of its European fleet for larger and faster aircraft. It may be decided, therefore, that the six Convair 340 aircraft now on order will be used in Europe, thereby releasing six Convair 240s for the West Indies.

B.O.A.C.'s PLANS FOR AFRICA

DURING a recent tour of Central and South Africa, B.O.A.C.'s chairman, Sir Miles Thomas, took the opportunity to discuss with representatives of Central African Airways Corporation and South African Airways the best way in which the territories served by these companies might benefit from the fast services to and from Europe which will become available when the new Salisbury Airport is ready to accept Comets. In Central Africa he talked on this topic with Col. Sir Ellis Robins, D.S.O., the chairman of C.A.A.C.

During the discussions reference was also made to the impact of trunk services on the existing revenue of C.A.A.C., particularly with regard to the traffic which the company now carries on the

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(Actual size)

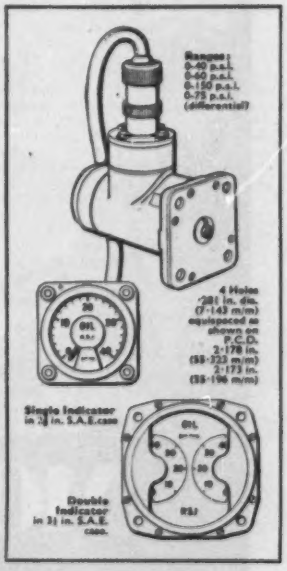
SIMPLIFIED MEASUREMENT OF OIL AND FUEL PRESSURES

Developed in conjunction with the British Engine Manufacturers, the Transmitter of this new electrical pressure measuring system is designed for direct flange mounting on the engine and is entirely unaffected by vibration, as there are no moving contacts.

Indicators may be of the single long scale type or twin scale, and calibrated 0-40, 0-60, or 0-150 p.s.i. for the oil pressure range and 0-75 p.s.i. for fuel pressures.

The equipment requires a power supply of 26 volts 400 cycles and a miniature transformer is available so that the system may be used on the standard 115 volt aircraft supply. The power input to the Transformer is 10 VA at ·5 Power Factor when the circuit contains a single Inductor Pressure Indicator.

Approved by the Air Registration Board and adopted by many British Constructors for Military and Civil Aircraft.



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CIVIL AVIATION . . .

regional routes between Johannesburg, Salisbury and Nairobi. The two chairmen also resolved to further the proposal to institute tourist-class services between Africa and London in 1953.

B.O.A.C. has stated that the possibility of delay in introducing services—due to the lack of suitable buildings at Kentucky Farm—is appreciated and representations on the matter will be made in the appropriate quarter.

On January 14th, Sir Miles left Central Africa for Johannesburg to discuss these proposals with S.A.A. who are, of course, B.O.A.C.'s partners in operating the Springbok service between Johannesburg and London.

LYMPNE AND SILVER CITY

AT the time of going to press, Lympne Airport—subject of our leading article last week—is still unserviceable for all aircraft of over 8,000 lb weight, as it has been for the past three weeks. This state of affairs has seriously affected Silver City Airways' important cattle contract. For some days Irish cattle already in the area were flown to France from West Malling, while others in transit were re-routed to Blackbushe and flown to Le Touquet—a 246-mile round trip. It has been estimated that this resulted in a loss of £500 per flight to the company, who have a fixed-rate contract. During the last few days a further batch of 100 cattle has been flown from Southend, and 250 more are on the way to this airport for air freighting. Operations from Southend have been particularly satisfactory, though, of course, the journey is again longer and the company must inevitably show a small loss on this work.

Silver City, who are negotiating with the M.C.A., state that they are still urgently trying to arrange to take over Lympne on a management basis and are themselves willing to spend up to £30,000 on improvements. The M.C.A. say that as many men as possible are filling in ruts at the airport.

KOREAN AIR LINK TO RE-OPEN

THE South Korean Government is intending to open an air service between Pusan and Formosa as soon as Japan grants approval for the use of Haneda (Tokio) airport as a stopping point for Korean aircraft. The Korean National Airline has already submitted to its government a programme detailing its proposed schedules. The Chinese Nationalist Ambassador to Pusan has expressed the opinion that his own government would welcome the project.

It is intended that the initial frequency of the service should be two round-trips weekly, on which 24-seat aircraft (presumably Dakotas) would be used.

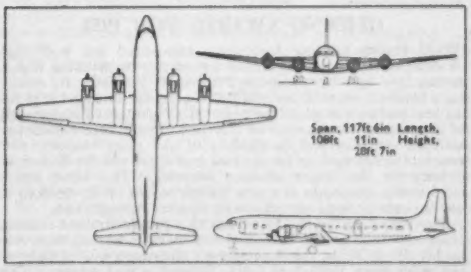
AIR FRANCE FLEET PLANS

NEWS is now to hand of progress with the construction of the Breguet 763 Provence and SE-2010 Armagnac airliners which are being built for Air France. The company has on order 12 of the former and 8 of the latter type.

The 763, or "Deux-Ponts" as it is sometimes known, is intended for use on French metropolitan high-density routes while the Armagnac will probably be used on services in the French Union.

Three alternative interior layouts are now planned for the Provence. The first allows for 36 first-class passengers in "sky-lounge" extendable seats on the upper deck, and 48 second-class passengers in removable seats on the lower deck; these seats can be stacked to provide space for seven tons of freight as an alternative load. The second version will have 48 first-class Pullman seats on the upper deck and 48 second-class seats (or six tons of freight) on the lower deck. The third arrangement, which is to be that incorporated in the first few production aircraft delivered, will have a "tourist-class" layout (something between the first and second classes)—59 seats on the upper deck, and 48 (or five tons of freight) on the lower deck. This version can be quickly modified to seat 69 second-class passengers above and 48 (or 4.3 tons of freight) below.

The eight Armagnacs in production for Air France are said to be making satisfactory progress. At the moment, the first three are undergoing flight trials, and the other five are in states ranging between 95 per cent and 65 per cent readiness. One of the three prototypes is to be lent to the French company, T.A.I., for experimental freight services between Paris and Dakar; after satisfactorily completing 400 hours on these duties the Armagnac will then be cleared for passenger services.



DOUGLAS DC-7 : The next step in the evolution of the Douglas "DC" airliner series is this elongated and higher-powered offspring of the DC-6. As reported in "Flight" of January 11th, American Airlines have ordered 25 of them. The power units are to be Wright R-3350 compound engines of 3,250 h.p. each. The cruising speed will be 360 m.p.h. and up to 95 passengers will be accommodated.

PRESTWICK IMPROVEMENTS

AFTER meeting the Scottish Advisory Council in Edinburgh last week, the Minister of Transport and Civil Aviation, Mr. J. S. Maclay, announced that work is to be put in hand immediately to improve facilities at Prestwick and Renfrew airports. It had been decided, he said, to add a 1,000ft compacted overrun to the existing 7,000ft main runway at Prestwick. This would make the runway suitable for all civil aircraft which are now either flying or on the drawing boards of any country.

Negotiations are now in progress for a contract for work on the overrun which will probably take about six months to complete.

Mr. Maclay suggested, also, that the problem of diverting the present Ayr-Kilmarnock road could be solved by constructing a short temporary stretch of road parallel to, and a little to the west of, the existing road which would then be lowered so as to form part of the overrun. Road traffic would be controlled as at present. Reference was made also to plans for constructing new terminal buildings at Renfrew, where work on minor improvements is to begin immediately.

The chairman of the Advisory Council, Sir Patrick Dollan, expressed satisfaction with the Minister's proposals, with which the Scottish Aerodromes Board is also in agreement.

DEUTSCHE DECCA

AS time goes on the ambit and performance of the Decca Navigator system is steadily extended. Last week, on January 17th, the latest addition to the system coverage, the new German chain, was formally opened by Dr. Seebohm, the Minister of Transport in the Federal German government. The ceremony took place at Düsseldorf amid a distinguished company, and a feature of the occasion was a series of demonstration flights by the M.C.A. Decca-equipped Marathon; many of those present flew in the aircraft and gained first-hand experience of the aid.

Brigadier John Lingham, C.B., D.S.O., M.C., Land Commissioner for North Rhine, Westphalia, said he wished to welcome whole-heartedly the European and American representatives who were present; he drew attention to the high degree of co-operation which existed between the Decca Company and their German licencees, Telefunken Gesellschaft.

Mr. E. R. Lewis, chairman of the Decca Company, gave a brief outline of the historical development of the system, and said that the German authorities were quick to realise its potentialities. In January last year a contract was placed with Telefunken, and to have got the chain in operation in 12 months was a very fine piece of work. In the meantime, the French Government had placed a contract with the Société Française Radioélectrique for the construction of the French chain, and when this is completed, Decca coverage over the greater part of Europe will be achieved.

Dr. Pohontsch, a senior director of Telefunken, thereafter followed with a brief explanation (for the benefit of his compatriots) of how the system worked. Sir Norman Guttery, K.B.E., C.B., Deputy Secretary of the Ministry of Transport, then said that Decca was today fitted to over 1,000 ships under the flags of 13 countries, and he thought that no single invention had done more for the safety of life at sea.

Air Chief Marshal Sir Frederick Bowhill, C.B.E., K.C.B., C.M.G., D.S.O., Chief Aeronautical Adviser to the Ministry of Civil Aviation, said that the system had always made it possible for a pilot to determine his position accurately at any time, but the latest development, the Flight Log, enabled him to set his required course or fly intricate holding patterns with comparative ease, since his track was being steadily traced and recorded on a special chart in front of him.

The necessity for a captain of aircraft to know his exact position became more and more important every day, whether he was fixing his position for accurate aerial photography or approaching an international airport in bad conditions; whether he was flying to Berlin and must not stray outside the strict corridor limits; whether he was flying a jet-propelled aircraft which, because of high fuel consumption, could afford no delays, or a slow helicopter approach-

CIVIL AVIATION . . .

ing a small alighting area. He believed that the Decca system would prove to be the ideal navigational and approach aid for the helicopter.

Much cover over the air routes of Northern Europe already existed, and the new chain would considerably extend Decca cover over some of the busiest air routes in the world, outside the U.S.A. All concerned were to be congratulated on building and opening this new Decca chain, which would help ships and aircraft of all kinds and of all nations to proceed more safely on their devious ways.

Dr. Seebohm then formally declared the new chain open for operational use. The stations comprising the new chain are as follows: the master is at Madfeld, N 51.26.30., E 08.42.45; the red slave is at Stadtkyll, N 50.21.55., E 06.32.04; the green slave is at Zeven, N 53.17.08., E 09.16.10; and the purple slave is at Oberlauter, N 50.19.25., E 10.59.21.

BREVITIES

MR. R. S. S. DICKINSON who (as announced in *Flight* of August 10th, 1951) was selected to succeed G/C. Christopher Clarkson, A.F.C., as Civil Air Attaché in Washington, was due to leave this country on January 22nd to take up his post in the U.S.A. on the 30th.

* * *

M.C.A. airport statistics for 1951 show that, following Northolt and London, Dublin was the third busiest airfield; movements often exceeded 80 a day. On the Continent, only Paris, Amsterdam, Zurich and Rome handled more traffic than Dublin.

* * *

Claiming to be one of the airlines' best customers, an American diamond merchant, Mr. Maurice Whitmond, set off last week on his 185th Atlantic crossing since the war. He has made the round trip between New York and London every third week since 1946. In this time he has spent more than £22,000 on airline tickets.

* * *

At Dorking Magistrates' Court recently a private pilot pleaded guilty of failing to comply with Rule 30 of Schedule II of the Air Navigation Order, 1949, in that he failed to obtain prior clearance from Air Traffic Control before making a flight for which he was required to obtain such clearance. He was fined £100 and ordered to pay £5 5s. costs.

* * *

The Parliamentary Secretary to the Minister of Transport, Mr. J. G. Braithwaite, said in Cardiff last week that progressive local authorities should now consider providing sites for "air stops" to cater for the helicopter travel which, he said, "looks like revolutionizing the whole of our air-transport system within the next ten years." Among the towns which are already looking into this question is Bristol; the authorities have selected a site at Brandon Hill, within a quarter of a mile of the city centre, and preliminary preparations are being made to use it as a helicopter station.

B.O.A.C. has received C.A.B. permission to extend its Bahamas-Jamaica route by flights originating or ending in London or Prestwick. Boston cannot be served by the same flights as Jamaica. The C.A.B. has also extended, for three years, the right of K.L.M. to fly from Amsterdam to New York.

* * *

The Australian Civil Aviation Department is once more examining the problem of selecting an alternate international airport for Mascot. At present all diversions are made to Dubbo airport but, as a result of the new investigation, Narromine has been selected as the main emergency airport for Mascot, from which it lies 200 miles to the north-west. Narromine is said to be almost entirely free from fog throughout the year.

* * *

Representatives of Canadian Pacific Airlines announced last week that Comet flights on the New Zealand-North America route are expected to begin in mid-September. The Comet is expected to reduce the present elapsed time on the Sydney-Honolulu leg to 12 hr. It will average 500 m.p.h. on the Trans-Tasman section between Auckland and Sydney. The company has also predicted that the complete route will be served by "an even faster version of the Comet" by the time the Empire Games take place in Vancouver in 1954.

* * *

The high degree of co-operation in air transport which was established between the Scandinavian countries immediately after the war has been further heightened by a joint agreement between the governments of Denmark, Norway and Sweden; it was concluded in Oslo at the end of December. The new agreement includes certain economical guarantees, lays down regulations for the transfer of S.A.S. equipment between the countries in question, and also provides for the disposition of material and personnel should any party become involved in war.

FACILITATING RADIO INSTALLATION

IN addition to the manually operated remote-control units for use in conjunction with the Plessey P.TR.61 C and D transmitter-receiver (illustrated in *Flight* of November 30th), an electrical remote-control has now been developed. This facilitates installation of the set in an aircraft without restriction as to position or distance from the control box, and permits the use of more than one control point without additional complication.

The P.TR.61 C and D provides V.H.F. R/T. communication

The Plessey receiver with electrical remote-control adapter, and (left) operator's control box.

on any one of six crystal-controlled channels within the 116-132 mc/s band, and this remote control system provides, by the operation of a single control on the control box, selection of any one of these crystals, the entire procedure of tuning and crystal selection being carried out automatically.

Provision is made for immediate access to carry out the pre-set adjustments of the tuning control; use of a tuning meter, connected to the monitor socket provided on the front of the equipment, allows any of the channels to be readjusted without removal of the equipment from the aircraft.

Total weight of the remote-control equipment, with one control box to S.B.A.C. standard dimensions, is approximately 2¾ lb, and current consumption is quoted as 3.5 amp. An alternative type of controller is available for installation in aircraft not fitted with S.B.A.C. racking.

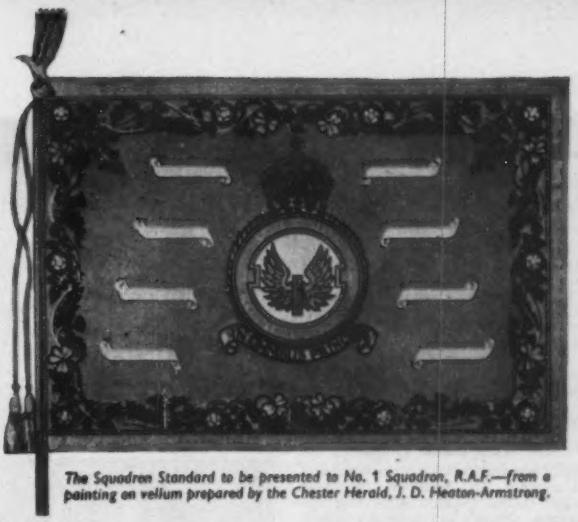
GLIDING AWARDS FOR 1951

THE British Gliding Association announced last week that three of its five major annual awards for outstanding flights during 1951 have been made to F/L. A. W. Bedford. By reaching a height of 18,100ft he qualified for the de Havilland Cup for the best gliding altitude of the year. His flight from Farnborough to his declared destination of Usworth airfield near Newcastle-on-Tyne on May 2nd (a distance of 257 miles) secured two awards, the Manio Cup for the best goal flight and the Wakefield Trophy for the longest distance achieved. This latter flight, incidentally, also ranks as a new British record. F/L. Bedford is now an experimental test pilot with Hawker Aircraft, Ltd.

The Volk Cup for the best flight to a pre-determined turning point and back to the launching-site without landing was won by Mr. P. A. Wills, the Association's chairman, with a flight of 163 miles from Redhill to Little Rissington and return. The fifth award, the Seager Cup for the best two-seater performance of the year went to an A.T.C. instructor from Detling, F/L. Charman Thomas; he was accompanied by a young cadet as passenger. This last flight—one of 64 miles from Great Hucklow to Derby and back—was made during the National Gliding Championships last year.

SERVICE AVIATION

Royal Air Force and Naval Aviation News



The Squadron Standard to be presented to No. 1 Squadron, R.A.F.—from a painting on vellum prepared by the Chester Herald, J. D. Heaton-Armstrong.

STANDARDS for R.A.F. REGT. and R.AUX.A.F.

IN 1943, on the 25th anniversary of the formation of the Royal Air Force, the King announced his intention of marking the occasion by the award of a ceremonial flag, to be known as the Standard, to operational squadrons of the Royal Air Force which had been in existence for 25 years or had earned appreciation by virtue of specially outstanding operations.

It is announced that the King has now been pleased to approve that squadrons of the R.A.F. Regiment and the Royal Auxiliary Air Force shall also be eligible for the award.

At the time when the Standards were first awarded, in 1943, it was announced that R.A.F. Squadrons Nos. 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 14, 20, 24, 25, 27, 28, 30, 31, 39, 45, 47, 55, 56, 60, 70, 84, 100, 207, 208, and 216 had qualified by length of service on April 1st, 1943. To these squadrons are now to be added Nos. 9, 10, 13, 15, 16, 17, 19, 22, 23, 26, 29, 32, 33, 41, 43, 58, 99, 101, 111, 201, 202, 203, and 205, which had qualified by length of service on December 1st, 1951. Also included are Nos. 120 and 617 Squadrons, which, although they have not been in existence for 25 years, have earned His Majesty's appreciation of specially outstanding achievements in operations. While these two squadrons have been so honoured, it is felt that many of the units which have received the award on account of their age would in any case have qualified by reason of their operational records.

The King has also approved the award of his Standard to No. 2 Armoured Car Squadron of the R.A.F. Regiment and No. 502 (Ulster), 600 (City of London), 601 (County of London), 602 (City of Glasgow) and 603 (City of Edinburgh) Squadrons of the R. Aux. A.F. in recognition of their completion of 25 or more years of existence on December 1st, 1951.

No squadron has yet received its Standard, but the Standards are being made and instructions will be issued as to their presentation, consecration, custody and the ceremonial to be observed when they are carried or paraded.

The Standard will consist of a rectangular silk flag with the squadron badge centred on a light blue background. The silk will be fringed and tasselled, with scrolls added for recording battle honours. The Standard will be carried by means of a staff surmounted by a gold eagle.

The battle honours to which each squadron is entitled will be notified to it by Command Headquarters. The maximum number of battle honours which can be shown on the scrolls to the Standard is eight and a squadron entitled to more than that number must select the battle honours to be commemorated in this way.

No. 120 Squadron was originally formed at Cramlington in January, 1918. It never became operational and was, from May, 1919, until its disbandment in October, 1919, an aerial post squadron with the Army of the Rhine. It reformed at Nutts Corner on June 6th, 1941, and operated with Liberator aircraft in Coastal Command throughout the war.

The squadron commenced to fly anti-U-boat sweeps and convoy escort patrols from Northern Ireland in September, 1941, and towards the end of the year performed reconnaissance patrols along the Norwegian coast and in the Skagerrak from Wick. Early in 1942 patrols were flown over the Bay of Biscay to search for enemy blockade runners off the north-west coast of Spain. Reconnaissances were also flown north of the Arctic Circle, including a reconnaissance of Jan Mayen Island. These Arctic reconnaissances, which continued throughout 1943 in support of convoy movements, became known as "Blue Nose" patrols.

In September a detachment proceeded to Iceland and carried out the squadron's normal work of convoy escort patrols and anti-U-boat sweeps. On one occasion seven U-boats in the vicinity of a convoy were sighted and one was destroyed.

In 1944 Leigh Lights were fitted to the Liberators to assist in attacking submarines and operations were carried out against U-boat concentrations along the Norwegian coast. Moving to Ballykelly in March, 1944, the main weight of effort around D-Day swung to the Channel area and the squadron operated in that area, although few submarines were seen. During the latter part of the war the squadron continued to hunt in the sea areas W.S.W. of Ireland, in the Northern Atlantic, and even in the Irish Sea.

No. 120 Squadron was the top-scoring squadron of Coastal Command, sinking 16 U-boats and assisting in the sinking of 3 others. The squadron was disbanded on June 4th, 1945, and revived on October 1st, 1946, by renumbering No. 160 Squadron.

No. 617 Squadron formed at Scampton on March 24th, 1943, and was equipped with Avro Lancasters. Its first operation took place on May 16th, 1943, when the German dams at Möhne and Eder were breached. Of the 19 aircraft which took part, 8 failed to return. Thirty-three members of the crews were decorated for this operation and the commanding officer, W/C. Guy Gibson, was awarded the Victoria Cross.

In July, 1943, the squadron made "shuttle service" attacks against targets in Northern Italy, subsequently landing in North Africa, and on the return journey attacked Italian targets again.

In August the squadron moved to Coningsby and on September 15th and 16th, 1943, the Dortmund-Ems Canal was attacked, the 12,000 lb H.C. bomb being used for the first time. On the following night the Antheor viaduct on the French-Italian border was attacked. The viaduct was again attacked in November.

From December, 1943, the squadron operated with great success against specially selected enemy targets which were of vital importance to the enemy. One of the most successful raids of this winter period was the attack on the Gnome-Rhone works at Limoges in February. In March, 1944, five attacks were made against German-controlled factories in France, using a new marking technique.

On D-Day the squadron made one of the main "spoof" raids and on June 8th and 9th, the first "Tallboy" bombs were dropped on the Saumur railway tunnel. Both operations were highly successful. In September, 1944, the squadron operated from an advanced base in Russia against the German battleship *Tirpitz*, and a second attack was made in October from a base in Scotland. On November 12th, 1944, in conjunction with No. 9 Squadron, the ship was attacked for the third time and was capsized in Tromsö Fjord.

Further attacks on Dams were made in October-December when the Kembs and Urft Dams were attacked. Attacks were made in December on E-boat bases at Rotterdam and shipping in Oslo Fjord, Bergen and Ijmuden were attacked in January. In March, 1945, the first

SERVICE AVIATION . . .

"Grand Slam" was dropped on the Bielefeld Viaduct. The last operation by the squadron was an attack on Herr Hitler's famous retreat at Berchtesgaden.

Promotion for Sir John Baker

IN a supplement to the *London Gazette* for January 15th, it was announced that Air Marshal Sir John Baker, K.C.B., M.C., D.F.C., had been promoted to the rank of air chief marshal as from January 2nd.

Sir John has been A.O.C.-in-C. M.E.A.F. for the past two years and, as announced last week, is returning home to become Deputy C.A.S. in place of Air Chief Marshal Sir Arthur P. M. Sanders, K.C.B., K.B.E., who will become the new A.O.C.-in-C. M.E.A.F. at the end of May.

G.U.A.S. Wins Hack Trophy

THE Hack trophy for the best all-round University Air Squadron has been awarded to the Glasgow University Air Squadron. Queen's University Air Squadron, Belfast, the previous holders, were the runners-up. Less than 3 per cent separated the marks of the two units. The pilots of the winning team were G.S.S. Barr, R. J. Burns, S. James, D. F. Moffat, J. B. Stewart and W. G. Watson.

G.U.A.S., which is commanded by W/C. K. C. Roberts, A.F.C., has also won the Scone trophy.

Royal Escort by Avro Shackletons

SIX of Coastal Command's new Shackletons will act as escort to the *Gothi* when Princess Elizabeth and the Duke of Edinburgh arrive and depart from Ceylon on their way to Australia. Before carrying out this escort duty the Shackletons will have made a formation flight to Ceylon for exercises with the East Indies Fleet, these operations coinciding with the Royal visit. It will be the first formation flight overseas by these maritime reconnaissance aircraft and, while in Ceylon, they are expected to make a number of demonstration flights.

The Shackletons are scheduled to leave St. Eval on February 7th and to fly to Ceylon with only two stops—El Adem and Aden. On their return to St. Eval they will have flown nearly 16,000 miles—averaging close on a thousand miles for every day they are away from their U.K. base. The time-table is: February 7th, St. Eval to El Adem, 1,700 miles; 8th, El Adem to Khormaksar (Aden), 1,600 miles; 9th, Khormaksar to Negombo (Ceylon), 2,000 miles. Mileages are approximate.

The aircraft are scheduled to leave Ceylon on February 22nd, and over the same route and using the same flight stages, to arrive at St. Eval on February 24th.

WEST COUNTRY VISITOR: Lord De L'Isle and Dudley, Secretary of State for Air, during his visit to St. Eval, Cornwall, last week. With him are (right) A. V-M. G. R. Spencer, A.O.C. No. 19 Group, and G.C. D. M. Somerville, Station Commander. The S. of S. went to see the newly arrived Lockheed Neptunes.

"Flight" photograph

ON TOP DOWN UNDER: Air Marshal J. D. I. Hardman, the new C.A.S. of the R.A.A.F., is greeted on arrival in Australia by (right) his predecessor, Air Marshal G. Jones.

(BELOW)

LOGISTIC LOGIC: A. V-M. J. L. Plant presiding at his cross-servicing conference last Friday. Beside him is Col. M. David of the French Air Force.

"Flight" photograph

Operation Dedale

AT the direction of Lt.-Gen. Lauris Norstad, the Air Commander in Chief of Allied Air Forces, Central Europe, A. V-M. J. L. Plant, R.C.A.F., his Assistant Chief of Staff for Logistics and Personnel, has been tackling the problem of interchangeable servicing facilities for aircraft equipping any of the air forces participating in A.A.F.C.E.

On January 7th, at Fontainebleau, under the name of Operation Dedale, 35 specialists from six nations met to consider a number of simplifications for first- and second-echelon maintenance; the first echelon would cover servicing and daily inspections and the second would deal with repair and overhaul work done by station technical units. As a beginning it was proposed to tackle the first echelon maintenance of the Vampire, Meteor, F-84 and F-86, which fighters it would be essential in war-time to operate from any allied airfield in Europe. To these will be added the Canberra and B.26.

To show the progress already attained, A.V-M. Plant held a Press conference at Beauvechain, Belgium, last Friday. In the hangar adjoining the conference room were examples of the four selected types, together with the necessary equipment adapted to service any of the aircraft.

A.V-M. Plant illustrated the scope of his problems by showing the growing complication of war equipment per one-man unit. The caveman with his bludgeon had a one-piece armament, the longbowman a ten-piece weapon. With the advent of gunpowder the rifleman's weapon had ten times as many pieces as that of the archer and, as a final example, there was the modern F-84 pilot with his 8,385,632-piece weapon. Of this fantastic number of separate parts, more than 750,000 were in the Allison J-35 turbojet.

If the six countries concerned decide to fit the adapters devised during this tryout, it will give Gen. Norstad very much greater operational freedom. The ideal, of course—as pointed out by A.V-M. Plant—would be the standardization of all aircraft fittings and screw-threads, but this would prove too costly a process.

Major repairs and overhauls are next on the list for integration. Each country is, of course, responsible for its own equipment but there is at the moment a conference of senior maintenance staff who are exploring the problems concerned in setting up central depots where such work can be done. The cost of these repair depots would be shared by the nations.

Perhaps the biggest problem of all is that of language, and it is proposed to issue to aircrews pamphlets in which ordinary servicing requirements are printed in all the N.A.T.O. languages. All the pilot has to do is to point to the paragraphs dealing with what services are wanted, the ground staff then being able to read the instructions in their own language. It is thought that the painting of servicing points to a colour code would also help a great deal.

The accompanying table illustrates the complexity of cross servicing:—

Items	Franco-British Vampire	Belgo-Dutch Meteor	U.S. F-84 Thunderjet	Canadian F-86 Sabre
Systems requiring cross-servicing	15	15	14	15
Mechanics for daily servicing	6	6	4	7
Inspection covers in each aircraft	44	77	142	84
Points in each aircraft requiring servicing during periodic inspections	155	180	210	325

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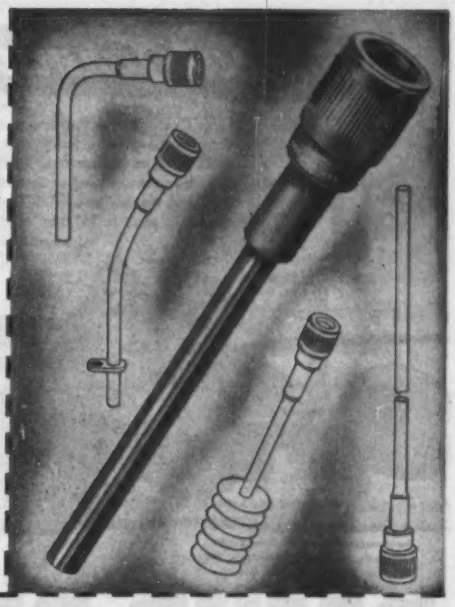

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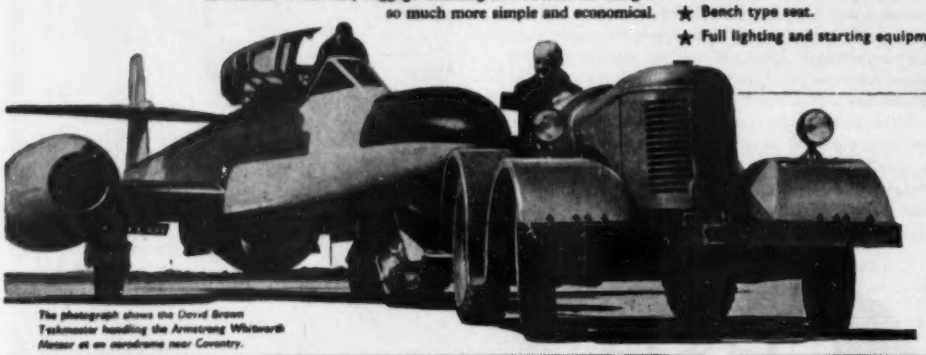

The photograph shows the David Brown Taskmaster handling the Armstrong Whitworth Meteor at an aerodrome near Coventry.

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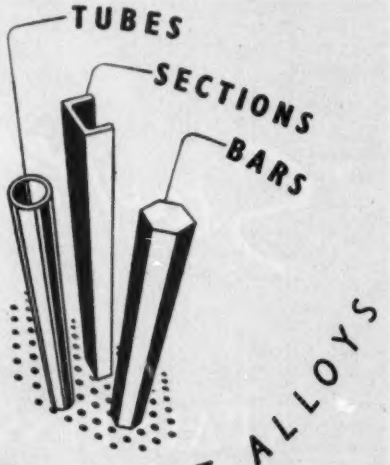

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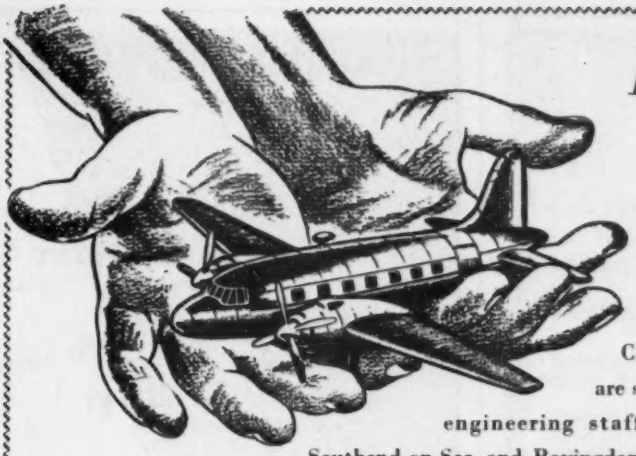

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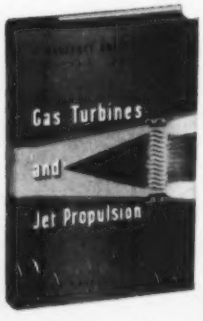

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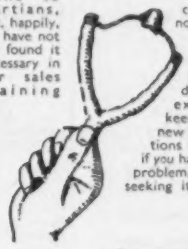

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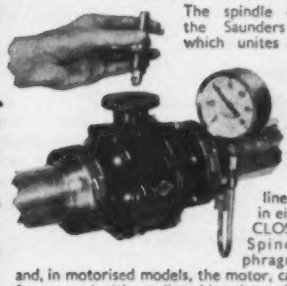

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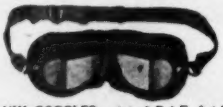

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RATE of pay 150/-, rising to 166/-, for a five-day week of 44 hours. Other conditions of service will be supplied on application.
APPLY, giving age, particulars of apprenticeship and training (including Forces training), qualification and experience to the Civil Administrative Officer, Ministry of Supply, Boscombe Down Amesbury, Wilts. [7584]
TECHNICIAN for performance office for mathematical analysis of aircraft fuel requirements. Higher National and 3-4 years' technical experience desirable.—Apply, giving full details, to Personnel Manager, Flight Refuelling, Ltd., near Blandford, Dorset. [7575]
EXPERIENCED weight control engineer. A vacancy occurs at The Heston Aircraft Co., Ltd., Heston Airport, Hounslow, Middx.—Application should be made to Chief Designer, stating age, experience, and salary required. [7578]
GLOSTER AIRCRAFT Co., Ltd., have vacancies for fully experienced aircraft structural and electrical draughtsmen.—Applications, in writing, stating age, experience and salary required, to Employment Officer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [0910]
TECHNICAL assistant required for design study section of aircraft company located in Bedfordshire. Principal duty will be aircraft performance estimation, but other work of varied and interesting nature is entailed.—Apply, with full details to Box 6282, quoting Reference M.7. [7522]
ADVANCED project of national importance requires propulsion technicians with knowledge of aero or thermodynamic theory. Approximately Higher National Certificate standard.—Apply, stating age, experience and salary required, to Box 6283, quoting Reference M.8. [7523]
KING AIRCRAFT CORPORATION invite applications for an experienced buyer. Knowledge of aircraft specifications and raw material markets, also ability to read drawings essential. Technical background an advantage.—Apply to 5th Street, Montrose Avenue, Hillington, Glasgow, S.W.2. [7574]
THE DE HAVILLAND AIRCRAFT Co., Ltd., Christchurch Aerodrome, Hampshire, have vacancies for the following: Experienced electrical engineering draughtsmen required accustomed to aircraft installation work.—Apply in writing to the Personnel Manager, stating age, experience, and salary required. [7519]
VACANCIES for draughtsmen and stressmen exist in the Saunders-Roe Helicopter Division at Eastleigh, near Southampton.—Interested persons should apply, stating age, experience, qualifications, salary required, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, Isle of Wight. [7600]
TECHNICIAN required for gas dynamics calculation with experience in the performance, estimation and proportioning of turbines. Write, stating age, qualifications and salary required, to the Personnel Officer, Sir George Godfrey and Partners, Ltd., Hampton Road, Hanworth, Middlesex. [7594]
APPLICATIONS are invited from senior and intermediate design draughtsmen: experience of aero engine design desirable but not essential.—Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0949]

SITUATIONS VACANT

ONE male test laboratory assistant required. National Certificate standard and preferably 3-5 years' experience on design and analysis of mechanical tests.—Applications, in writing, stating age, experience and salary required to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds. [7597]

THE Supermarine Works of Vickers-Armstrongs, Ltd. have vacancies for mechanical and structural engineering draughtsmen with aircraft experience preferred.—Write, giving full details of experience and salary required, to Personnel Department, Vickers-Armstrongs, Ltd., Hursley Park, near Winchester. [7535]

AIRCRAFT ground engineer required licensed A. and C. on Pazside and Consul. Would be given opportunity obtain licences modern type. Required to work overseas several months each year when special allowances issued. Home rate of salary £9/10/- to £10 per week, according to experience.—Write Box 6344. [7598]

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. This work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [7602]

EXPERIENCED stressman required, for responsible position in stress office. Minimum requirements B.Sc. (or equivalent), several years' experience, ability to take charge of stressing of complete aircraft.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds, giving details of training, experience, age and salary required. [7606]

FLYING instructor required for Basic Flying Training School at Sywell. Applicants must have held C.F.S. category and be on the R.A.F. Reserve, or be prepared to join.—Applications, stating age, qualifications and details of experience, should be made in writing to the Manager, Brooklands Aviation, Ltd., Sywell Aerodrome, Northampton. [7543]

DRAUGHTSMEN with knowledge of aircraft undercarriages and hydraulic equipment required. Applicants should be not less than 20 years of age and be in possession of H.N.C. upwards. Remuneration will amply compensate applicants making a change.—Applications to Personnel Manager, Electro-Hydraulics, Ltd., Warring ton. [7571]

JIG and tool draughtsmen (age 25-35) required by manufacturers of automobile and aircraft accessories in South Midlands. Practical experience in technical and production shops and good technical qualifications essential. Salary according to ability. Single lodging accommodation available. State salary, age, and full particulars.—Box 6342. [7570]

THE ENGLISH ELECTRIC Co., Ltd. has vacancies in London and Warton (near Blackpool) for aircraft stressmen. Suitably qualified men, having structural stressing experience should write giving full details and quoting Ref. 803B to Central Personnel Services English Electric Co., Ltd., 24-30 Gillingham Street, London, S.W.1. [7551]

PILOT with twin engine experience required by aerial survey company. Applicant should have good educational background to enable to act as expedition manager when overseas and deal with clients, etc. Current licences desirable, but the right man would be given opportunity to obtain or renew licences. Age under 30 preferred.—Write Box 6343. [7567]

IMPORTANT Midlands aircraft engine manufacturer has vacancies for a number of designers and senior and junior draughtsmen. The work is connected with gas turbine engines. Although experience is most advantageous it is not necessarily essential, as training will be given.—Apply in some detail, please, to Armstrong Siddeley Motors, Ltd., Reference 101, Coventry. [0616]

AIR SERVICE TRAINING, Ltd., require Category A flying instructor for flight conversion duties at Karachi. Experience of Harvard, Fury and Tempest desirable. Salary approximately £2,000 per annum.—Application should be made to the Commandant, Air Service Training, Ltd., Hamble, Southampton, marking letters and envelopes "F.I.P." [7559]

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd. Applications are invited from senior and junior draughtsmen, and stressmen for work on this interesting programme.—Write, giving details of experience and salary required, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Luton, Beds. [0595]

SENIOR designer for aero engine gas turbine project design required in well-known London area. Previous experience on mechanical design is essential. Good prospects of promotion for a suitably experienced and enterprising candidate.—Please write, giving full details of age, experience, qualifications and salary required, quoting Ref. ACJ. to Box 6216. [7549]

THE GLOSTER AIRCRAFT Co. requires senior and intermediate stressmen to work on designs and projects of advanced interest. Excellent prospects of advancement for sound and energetic men.—Apply, in the first instance, giving full particulars of age, qualifications, age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [0911]

EXPERIENCED aerodynamicist required, for responsible position in aerodynamics department. Minimum requirements B.Sc. (or equivalent), several years' experience, ability to undertake all normal performance, stability and other aerodynamic work.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., The Airport, Luton, Beds, giving details of training, experience, age and salary required. [0600]

THE de Havilland Engine Co., Ltd. have the following technical vacancies available in the Experimental Test Beds Department of their Hatfield factory.—Junior technical assistants for test work in connection with recording and analyzing the performance data of development gas turbine engines. Good salaries and prospects to suitable applicants. Good canteen facilities, five-day week.—Please write, giving age, full details of previous experience and salary required, to the Personnel Officer, The de Havilland Engine Co., Ltd., Hatfield Aerodrome, Hatfield, Herts. [7539]

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giving full particulars of aeronautical experience, flying hours, types of aircraft flown and any licences held
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SITUATIONS VACANT

TECHNICAL assistants, both junior and senior, required in mechanical engineering department for work of national importance in connection with development of gas turbine engines. Excellent prospects exist in sections dealing with rig test of engine components, vibration static structure test and research in gears and bearings. Qualifications: degree or H.N.C.—Apply: Reference No. VI, Armstrong Siddeley Motors, Ltd., Coventry. [0962]

THE DE HAVILLAND AIRCRAFT Co., Ltd., Christchurch Aerodrome, Hampshire, have vacancies for the following: Senior method engineers with experience in machine shop, sheet metal or fitting shop. Senior and junior jig and tool draughtsmen. Preferably with experience of assembly jigs as well as small tools.—Apply in writing to the Personnel Manager, stating age, experience, and salary required. [7529]

DESIGNER draughtsmen required by Lockheed Hydraulic Brake Co., Ltd., Leamington Spa. Should be fully experienced in light mechanical engineering. Knowledge of hydraulics an advantage. Opportunity for early promotion to section leader grade on proof of ability. Single hostel accommodation available.—Write to Personnel Officer, giving full particulars of salary, age and experience. [7548]

HANDLEY PAGE (Reading), Ltd., The Aerodrome, Woodley, Reading, have a vacancy in their Design Office for a senior stressman with good experience and a degree or Higher National Certificate with endorsements in aeronautical subjects. Also required is a qualified weights control engineer to take charge of small weights section.—Please send full particulars to the Personnel Officer. [7574]

RADIO engineers. Licenced in Category A or B required by progressive company operating on Bovingdon Airport. Good salary and conditions, pension scheme, also radio mechanics, unlicenced but with maintenance experience of VHF, MF/DF, and radio compass. Please forward full details of experience and availability to Personnel Officer, Box 66, Allardyce Palmer Ltd., 106 Kingsway, W.C.2. [7599]

SENIOR technical assistant required for weight investigation of gas turbine design schemes. Some engine design and/or stress experience desirable. Good opportunity for young engineer with H.N.C. to broaden experience. Work involves some engine stressing.—Applicants should write, giving age and previous experience in chronological order to the Personnel Officer, The de Havilland Engine Co., Ltd., Star Lane, Edgware, Middlesex. [7468]

AIR SERVICE TRAINING, Ltd., require engineering instructor specialised in allied trades and basic instruction, i.e. welding, blacksmithing, coppersmithing and basic fitting for an appointment in Pakistan in connection with air force apprentice training. Salary approximately £1,700 per annum.—Application should be made to the Commandant, Air Service Training, Ltd., Hamble, Southampton, marking letters and envelopes "E.B." [7600]

THE Air Ministry invite applications from men for temporary appointments as group training officers in the rank of observer officer at Group Headquarters of the Royal Observer Corps. There are prospects of permanent appointment. Observer officer is the basic rank of the full-time officer cadre of the Corps. Vacancies in the higher ranks, viz. observer lieutenant, observer commander, and observer captain are normally filled by promotion.

CANDIDATES must have lecturing ability and experience in the organization and control of a small office. An interest in aviation, particularly identification combined with judgment of height and speed, is essential. Candidates must be prepared to serve anywhere within the United Kingdom. The minimum age for appointment is 25.

SALARY scale (London): £485 x £15—£540; rather less in the provinces.

FURTHER particulars and application forms may be obtained from the Under Secretary of State, Air Ministry (S.5 (P)), Cornwall House, Stamford Street, London, S.E.1. Completed application forms must be returned by February 15th, 1952. [7598]

SENIOR scientific officers; scientific officers; patent examiner and patent officer classes. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1952. Interviews will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1952, may eventually be announced. Successful candidates may be appointed immediately. The scientific posts are in various Government departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. The patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

CANDIDATES must have obtained a university degree with first or second class honours in an appropriate scientific subject (including engineering) or in mathematics, or an equivalent qualification, or for scientific posts, possess high professional attainments. Candidates for senior scientific officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for scientific officer and patent posts taking their degrees in 1952 may be admitted to compete before the result of their degree examination is known.

AGE limits. Senior scientific officers, at least 28 and under 31; for scientific officers and patent classes, at least 21 and under 28 during 1952 (or under 31 for permanent members of the experimental officer class competing as scientific officers). London Salary Scales: Senior scientific officers, (men) £750-£950; (women) £625-£850; scientific officers, (men) £400-£650; (women) £400-£525; patent examiner and patent officer classes, (men) £400-£600; (rates for women under review). Somewhat lower rates in provinces.

FURTHER particulars from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S 53/52 for senior scientific officers and S.52/52, S.123/52 for the other posts. [7601]

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SITUATIONS VACANT

TECHNICAL illustrators required for expanding publications department to prepare exploded and cut-away sectional views of fuel system components for gas turbine aero engines. Applicants must have sound art school and technical experience, and possess ability to grasp and illustrate clearly the construction and operation of components from blueprints.—Write, stating age, experience and salary required, to Personnel Dept., Joseph Lucas (Gas Turbine Equipment), Ltd., Shaftmoor Lane, Hall Green, Birmingham. [7590

TECHNICAL authors required for expanding publications department to prepare descriptive, overhaul and servicing manuals on fuel components for gas turbine aero engines. Applicants must be of Higher National Certificate standard with sound practical engineering experience, and have the ability to write clearly in concise terms.—Write, stating age, experience and salary required, to Personnel Dept., Joseph Lucas (Gas Turbine Equipment), Ltd., Shaftmoor Lane, Hall Green, Birmingham. [7587

DESIGNER draughtsmen required for interesting work on gas turbine aero engine test equipment. The work covers the design and detail of equipment for research, experimental and production projects from initial engine build procedure to component testing and final testing. Salaries in excess of £550 per annum will be considered for applicants capable of working on own initiative. Expenses paid to interview.—Apply to reference DDI, Personnel Manager, Armstrong Siddeley Motors, Ltd., Coventry. [7557

THE GLOSTER AIRCRAFT Co. requires the services of a number of aerodynamicists, (a) for design and project work, and (b) for flight test reduction. Opportunity exists for individuals to vary their experience within the Aerodynamics Department. Candidates with some years' experience preferred, but applications from Juniors with sound mathematical ability will receive full consideration. —Apply, in the first instance, giving full particulars of age, experience and salary required, to The Chief Designer, Gloster Aircraft Co., Ltd., Hucclecote, Glos. [7913

CENTRAL AFRICAN AIRWAYS have a vacancy for a technical assistant at their head office Salisbury, Southern Rhodesia. Applicants should have experience of performance analysis and reduction of test results to standard conditions, experience on turbine-engined types an advantage. The majority of the work will be concerned with detailed route analysis of various types and the compilation of statistical data on meteorological conditions. Preference for a single man age 24 to 30, who could emigrate within a month approximately. Salary within the range of £750 to £950, according to experience.—Apply immediately for interview appointment to I. C. McOran-Campbell, Royal Automobile Club, Pall Mall, S.W.1. [7595

SITUATIONS VACANT

AIRCRAFT inspectors required immediately in the following departments: jig and tool, fitting, sheet metal, machine shop, and component assembly. None but experienced men need apply. Good conditions and superannuation fund.—Write with full particulars, including age, to the Personnel Manager de Havilland Aircraft Co., Ltd., Airspeed Division, The Airport, Portsmouth, Hants. [7580

NORMALAIR, Limited, Yeovil, Somerset, require first-class designers and development engineers for work on aircraft pressurizing, air conditioning and high altitude breathing equipment. H.N.C. or its equivalent is minimum standard acceptable and applicants who should preferably have experience in light precision or instrument engineering, must apply, giving age, experience, qualifications and salary required to Personnel Officer. Selected applicants interviewed locally where convenient. [7566

MINISTRY OF CIVIL AVIATION. Air traffic control officers. Applications are invited for at least ten Grade III posts. Candidates must be at least 23 and under 35 years of age on January 1st, 1952. Essential qualifications are alertness, good personality, physical fitness, tact and balanced judgment. Candidates must produce evidence of having reached a prescribed standard of educational attainments linked to the pre-1951 School Certificate with Matriculation exemption standard. They must have had experience either as (a) aircrew in civil air transport, preferably as pilot or navigator, with considerable experience in the United Kingdom, or (b) pilot or navigator in the Armed Forces, preferably with considerable experience of air traffic control in the United Kingdom. Exceptionally, candidates without aircrew experience will be considered, provided they meet the educational requirements given above and have had considerable practical experience either in civil aviation or in the Armed Forces of duties directly concerned with the operation of air traffic control. Additional assets will be a general knowledge of civil aviation legislation and practice and of radio and radar aids to navigation and a working knowledge of the French language. Air traffic control officers are required to serve anywhere in the United Kingdom and are liable to tours of duty overseas. Rates of pay range from £450 per annum at age 23 to £700 per annum at age 30 or over, on entry, rising by annual increments to £935 per annum (subject to deductions from £10 to £40 for posts outside the London area). Posts are unestablished, but have long-term possibilities.—Apply to the Ministry of Civil Aviation, Room 424, Ariel House, Theobalds Road, London, W.C.1, for application forms and further particulars, quoting Reference Est.1a/ATCO. The latest date for receipt of completed applications is February 14th, 1952. Applications from overseas may be by letter in the first instance, giving date of birth and full details of qualifications and experience. [7588

SITUATIONS VACANT

DRAUGHTSMEN of all grades are required by the Aircraft Division of the English Electric Co., Ltd., for employment at Warton or in West London. Those men with good aircraft structure or jet engine installation experience are preferred, those with other light structural experience will be considered.—Write, giving full particulars, quoting Ref. 1250, to Central Personnel Services, English Electric Co., 24/30 Gillingham Street, London, S.W.1. [7603

A. V. ROE AND CO., Ltd. invite applications for the post of deputy LC wind tunnel in their aircraft research division at Woodford Aerodrome, Cheshire. Applicants should possess good academic qualifications with a sound knowledge of applied aerodynamics, and should have several years experience of testing and analysis of results; preference will be given to those possessing a knowledge of high-speed wind tunnels. The vacancy is on the Senior Staff and offers a good salary. —Applications should be made in writing, giving full details to the Labour Manager, A. V. Roe and Co. Ltd., Greengate, Middleton, Manchester. [7569

PROGRESSIVE firm making test equipment for aircraft instruments and undertaking development and manufacture of similar equipment has vacancy for assistant to chief designer. Work will entail outside contact with Service and private users of existing equipment in use, and with them and manufacturers on new development. Vacancy should attract well educated and qualified man with extensive knowledge of aircraft instrumentation and use; practical knowledge of application of electronics methods to instruments essential. Salary in relation to ability and progressive with development.—Write: Bryans Aeroquipment, Ltd., Willow Lane, Mitcham, Surrey. [7583

SITUATIONS WANTED

PILOT, British, ATPL, IR 6500 hours, 6000 command twins fours. Clean record, good references, willing post abroad.—Stubbs, Estancia, Burley, Hants. [7593

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